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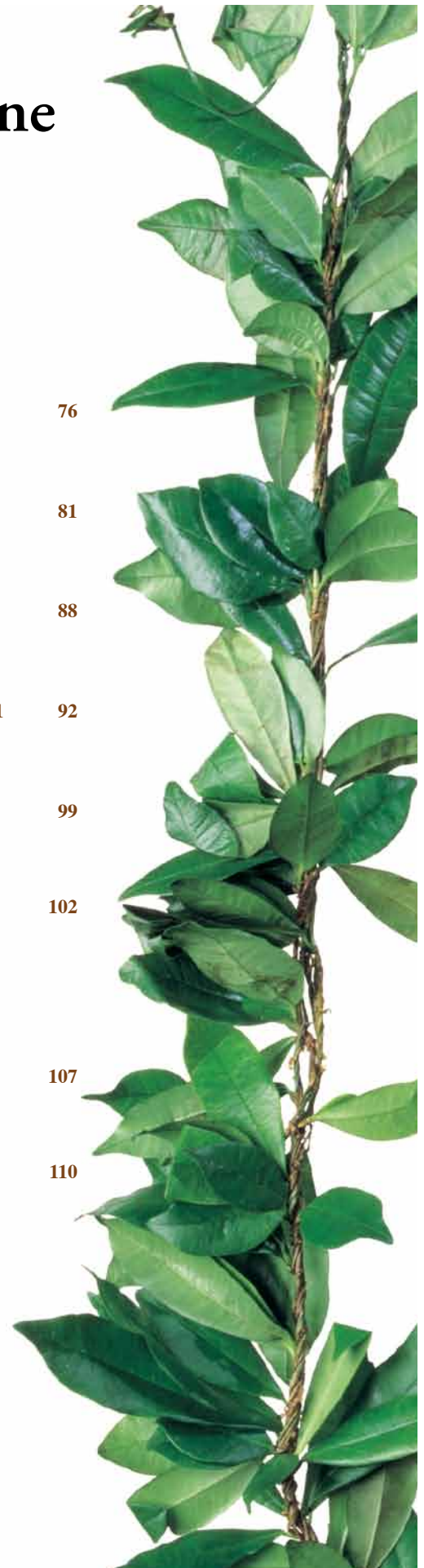
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Prices of Healthy and Unhealthy Beverages in High and Low Per Capita Income Areas

Corilee A. Watters PhD, RD; Rachel S. Corrado BA; and Frank J. Chaloupka PhD

Abstract

To better understand availability and price of beverages in Hawai'i, the prices of healthy (milk, orange juice, unsweetened tea, unsweetened coffee, diet soda) and unhealthy beverages (regular soda, fruit drink, sports drink, sweetened tea, flavored water) were collected and the beverage prices in lower per capita income areas and higher per capita income areas were compared. Cross-sectional data on prices of healthy and unhealthy beverages were collected from supermarkets, convenience stores, and quick serve restaurants from two lower per capita income areas (Waimanalo and Wai'anae) and two higher per capita income areas (Hawai'i Kai and Manoa) on O'ahu, Hawai'i from May 15 to June 10, 2012.

Using composite data from across all areas, there was a significant difference of \$0.58 (95% CI 0.46, 0.70) between the healthy beverages' mean price per 20 ounces (\$1.76 ± \$0.86) and the unhealthy beverages' mean price per 20 ounces (\$1.18 ± \$0.38) ($P < .001$). Although there was no statistically significant difference between per capita income areas, the lower per capita income areas' mean price per 20 ounces of healthy beverages was slightly higher and mean price per 20 ounces of unhealthy beverages was slightly lower than the higher per capita income areas. Pricing strategies that enable healthy beverages to be less expensive than unhealthy beverages is one method to increase consumption of healthy beverages and decrease consumption of unhealthy beverages. Reduction in unhealthy beverage consumption is needed to help reduce obesity, especially in the lower per capita income areas that have higher obesity prevalence.

Introduction

In O'ahu, lower per capita income areas tend to have higher obesity prevalence. In 2010, East Honolulu (including Hawai'i Kai, Kahala, and Wai'alaie) had a per capita income of \$48,993 and this area had an obesity prevalence of 18.8%. In contrast, Wai'anae had a per capita income of \$18,097 and the area of Wai'anae/Nanakuli had an obesity prevalence of 50.1%.¹⁻³ A study conducted on the island of O'ahu suggests that obesity prevalence may vary by geographical area due to varying degrees of obesogenic environmental factors.⁴

Sugar-sweetened beverages (SSBs) are one of the largest contributors to caloric intake.⁵ Over the years, increased consumption of SSBs has had a significant effect on the growing obesity epidemic.^{6,7} Several studies link SSB consumption with weight gain, including a longitudinal study conducted in O'ahu indicating soda (an SSB) intake is positively associated with weight gain among adolescent girls.⁸ A reduction in SSB consumption may be one strategy to decrease obesity prevalence.^{9,10}

Recent studies have shown that beverage prices have an impact on purchasing behavior.¹⁰⁻¹² For instance, when the price of a high caloric beverage increases by 20%-35%, the consumption of that beverage decreases which may, eventually, decrease the prevalence of obesity.¹⁰⁻¹³ In particular, lower per capita income areas may be more affected by price changes due to their lower disposable incomes.¹³

To better understand obesity prevalence in O'ahu, this study investigated the prices of healthy and unhealthy beverages and compared the prices within lower and higher per capita income areas. Considering that prices may influence beverage purchase behavior and that O'ahu has a high overall obesity prevalence and an even higher obesity prevalence in lower per capita income areas, the hypotheses of this study are Unhealthy beverages cost less than healthy beverages in general and; Unhealthy beverages in lower per capita income areas cost less than unhealthy beverages in higher per capita income areas.

Methods

Data on the prices of beverages were collected from May 15 to June 10, 2012. Four geographic areas on the island of O'ahu (Hawai'i Kai, Manoa, Waimanalo, and Wai'anae) were selected for assessment. Hawai'i Kai and Manoa were the higher per capita income areas, and Waimanalo and Wai'anae were the lower per capita income areas that were selected based on convenience.¹ Within each area, at least one supermarket (a store having at least five aisles of household staple foods), convenience store (a 7-eleven or other gas station/mart), and quick serve restaurant (L&L Hawaiian Barbeque, McDonald's, Burger King, or Zippy's) were assessed. In total, 8 supermarkets (2 in Hawai'i Kai, 2 in Manoa, 1 in Waimanalo, and 3 in Wai'anae), 5 convenience stores (1 in Hawai'i Kai, 2 in Manoa, 1 in Waimanalo, and 1 in Wai'anae), and 10 quick serve restaurants (4 in Hawai'i Kai, 1 in Manoa, 2 in Waimanalo, and 3 in Wai'anae) were selected based on availability.

Data collection was conducted throughout the week at various times by a University of Hawai'i at Manoa researcher using data collection forms. Beverages were first classified as healthy or unhealthy based on the 2010 Dietary Guidelines for Americans relating to nutrient density.¹⁴ Healthy beverages included milk (2% white milk, 1% white milk, chocolate skim milk), 100% orange juice, unsweetened tea, diet soda, and unsweetened coffee. Unhealthy beverages (beverages containing added sugar) included regular soda, fruit drinks, sweetened tea, sports drinks, and flavored water. Ready to drink sweetened coffee and energy drinks were treated as separate categories consistent with the beverage industry classification of these as functional drinks, and water was also considered separately consistent with the beverage industry's classification of bottled water.¹⁵ Up to three brands of beverages were chosen in each category; for each beverage category, the three cheapest brands were selected based on the prices of the smallest available size of that particular beverage. However, because multiple brands and sizes of soda and water were available, soda and water brands were selected based on two criteria. First, the selection process was

limited only to soda brands that were available in at least three different sizes; then, among these, the three with the lowest cost at the smallest size were included in the assessment. Similarly, the criteria used to select the brands of water were first availability in at least two different sizes, and then lowest cost at the smallest size. Once the beverage brands were selected, the prices and ounces of all available sizes (bottled, canned, and fountain drinks) of these beverage brands were collected. The goal was to ascertain the regular prices of these beverages (not sales prices) by checking the price labels and/or menus.

Mean price per 20 ounces was the primary unit used to compare the data since 20 ounces was the most common beverage size. Since both the price and size of each beverage was recorded, a beverage's price per ounce was easily calculated by dividing its price by its size in ounces; the calculated price per ounce was averaged across all available sizes for a particular beverage. A beverage's price per 20 ounces was then calculated by multiplying 20 by the previously calculated average price per ounce value.

The mean prices per 20 ounces of healthy and unhealthy beverages were compared in general and by per capita income area using analysis of variance (ANOVA), independent samples t-tests, and descriptive statistics. These data analyses were performed using SPSS Statistics version 20, and $P \leq .05$ was considered statistically significant.

Results

From the 23 stores assessed in this study, a total of 1,067 beverage prices were recorded providing information on various beverage categories (Table 1). These beverage prices were collected from beverages ranging in size from 8 ounces to 288 ounces (data not shown). A detailed list of beverages by size can be found in Table 2. By beverage classification, there were 401 healthy beverages (median price per 20 ounces = \$1.69; interquartile range (IQR) of prices per 20 ounces = \$1.10), 489 unhealthy beverages (median price per 20 ounces = \$1.12; IQR of prices per 20 ounces = \$0.61), 76 sweetened coffees (median price per 20 ounces = \$2.16; IQR of prices per 20 ounces = \$1.80), 40 energy drinks (median price per 20 ounces = \$2.74; IQR of prices per 20 ounces = \$0.73), and 61 waters (median price per 20 ounces = \$0.82; IQR of prices per 20 ounces = \$0.53) sampled in this study (Table 3).

The mean price per 20 ounces for healthy beverages was approximately $\$1.76 \pm 0.86$ and for unhealthy beverages was approximately $\$1.18 \pm 0.38$ (Table 3). The difference between the healthy beverages' mean price per 20 ounces and the unhealthy beverages' mean price per 20 ounces of \$0.58 (95% CI 0.46, 0.70) was statistically significant ($P < .001$; Table 3).

In higher per capita income areas, healthy beverages cost \$0.54 more per 20 ounces than unhealthy beverages ($P < .001$) (Table 4). In lower per capita income areas, healthy beverages cost \$0.62 more per 20 ounces than unhealthy beverages ($P < .001$; Table 4). The cost difference between healthy and unhealthy beverages was not statistically significant between income areas ($P = .53$; Table 4), and neither was the mean price of unhealthy beverages ($P = .34$; Table 4). Although not statistically significant, healthy beverages were slightly more expensive and unhealthy beverages were slightly less expensive in lower compared to higher per capita income areas.

Beverage Classification	Beverage Category	N ^a	Mean Price (\$) ± SD	Median Price (\$)	Interquartile Range
Healthy Beverages	Coffee (Unsweetened)	46	1.88 ± 0.43	1.82	0.56
	Diet Soda	171	1.20 ± 0.43	1.09	0.74
	Milk	60	2.70 ± 0.97	2.50	1.43
	Orange Juice	55	2.64 ± 0.65	2.45	1.13
	Tea (Unsweetened)	69	1.55 ± 0.62	1.55	0.64
Unhealthy Beverages	Flavored Water	17	1.69 ± 0.25	1.79	0.40
	Fruit Drink	107	1.17 ± 0.33	1.16	0.49
	Soda	238	1.19 ± 0.41	1.17	0.66
	Sports Drink	73	1.15 ± 0.33	1.12	0.50
	Tea (Sweetened)	54	1.09 ± 0.36	0.96	0.43
Coffee (Sweetened)	Coffee (Sweetened)	76	2.65 ± 1.15	2.16	1.80
Energy Drinks	Energy Drink	40	2.82 ± 0.48	2.74	0.73
Water	Water	61	0.98 ± 0.54	0.82	0.53
Total/Mean/Median/Interquartile Range		1067	1.55 ± 0.84	1.39	0.94

^a N represents the number of beverage prices recorded

Beverage Classification	Beverage Category	N ^a	Mean Size (ounces) ± SD	Median Size (ounces)	Interquartile Range
Healthy Beverages	Coffee (Unsweetened)	46	17.00 ± 4.16	16.00	8.00
	Diet Soda	171	38.14 ± 30.22	32.00	24.00
	Milk	60	34.67 ± 38.71	16.00	40.00
	Orange Juice	55	24.96 ± 18.75	16.00	15.00
	Tea (Unsweetened)	69	24.90 ± 14.27	21.00	20.50
Unhealthy Beverages	Flavored Water	17	22.82 ± 5.25	20.00	0.00
	Fruit Drink	107	31.76 ± 21.18	22.00	32.50
	Soda	238	38.87 ± 36.30	32.00	24.00
	Sports Drink	73	29.73 ± 11.09	32.00	12.00
	Tea (Sweetened)	54	30.76 ± 14.51	23.00	22.00
Coffee (Sweetened)	Coffee (Sweetened)	76	17.53 ± 6.99	16.00	8.50
Energy Drinks	Energy Drink	40	16.79 ± 2.44	16.00	0.00
Water	Water	61	30.65 ± 23.24	20.00	34.10
Total/Mean/Median/Interquartile Range		1067	31.13 ± 26.61	22.00	18.00

^a N represents the number of beverages recorded

Beverage Classification	N ^f	Mean Price (\$) ± SD	Median Price (\$)	Interquartile Range	Difference of Means (Healthy Beverages - Unhealthy Beverages)
Healthy Beverages ^a	401	1.76 ± 0.86	1.69	1.10	
Unhealthy Beverages ^b	489	1.18 ± 0.38	1.12	0.61	0.58 (95% CI 0.46, 0.70) ^g
Coffee (Sweetened) ^c	76	2.65 ± 1.15	2.16	1.80	
Energy Drinks ^d	40	2.82 ± 0.48	2.74	0.73	
Water ^e	61	0.98 ± 0.54	0.82	0.53	

^a Healthy beverages: milk, orange juice, unsweetened tea, unsweetened coffee, diet soda. ^b Unhealthy beverages: regular soda, fruit drinks, sports drinks, sweetened tea, flavored water. ^c Specialty coffees: sweetened canned coffees, flavored iced coffee, flavored lattes, etc. ^d Energy drinks: non-nutrient additive functional beverages (ginseng, ginkgo biloba, etc). ^e Water: bottled water. ^f N represents the number of beverage prices recorded. ^g The difference between healthy and unhealthy beverages' mean prices per 20 ounces is statistically significant ($P < .001$).

Beverage Classification	Per Capita Income Area	N ^e	Mean Price (\$) ± SD	Median Price (\$)	Interquartile Range	Mean Difference (Lower - Higher Per Capita Income Areas)
Healthy Beverages ^a	Higher Per Capita Income Areas ^c	217	1.74 ± 0.85 ^f	1.62	1.01	
	Lower Per Capita Income Areas ^d	184	1.79 ± 0.88 ^g	1.69	1.16	0.05 (95% CI -0.12, 0.22) ^h
Unhealthy Beverages ^b	Higher Per Capita Income Areas ^c	271	1.20 ± 0.38 ^f	1.22	0.59	
	Lower Per Capita Income Areas ^d	218	1.17 ± 0.39 ^g	1.09	0.63	0.03 (95% CI -0.03, 0.10) ⁱ

^a Healthy beverages: milk, orange juice, unsweetened tea, unsweetened coffee, diet soda (water excluded). ^b Unhealthy beverages: regular soda, fruit drinks, sports drinks, sweetened tea, flavored water (sweetened coffee and energy drinks excluded). ^c Higher per capita income areas: Hawai'i Kai and Manoa. ^d Lower per capita income areas: Waimanalo and Wai'anae. ^e N represents the number of beverage prices recorded. ^f The difference between the higher per capita income areas' healthy and unhealthy beverages' mean prices per 20 ounces is statistically significant ($P < .001$). ^g The difference between the lower per capita income areas' healthy and unhealthy beverages' mean prices per 20 ounces is statistically significant ($P < .001$). ^h The difference between the higher per capita income areas' and lower per capita income areas' healthy beverages' mean prices per 20 ounces is not statistically significant ($P = .53$). ⁱ The difference between the higher per capita income areas' and lower per capita income areas' unhealthy beverages' mean prices per 20 ounces is not statistically significant ($P = .34$).

Discussion

The price of unhealthy beverages was significantly less than the price of healthy beverages in both the higher and lower per capita income areas. The average 20 ounce unhealthy beverage cost approximately 58 cents less than the average 20 ounce healthy beverage. According to several studies, this price difference

may affect an individual's choice of beverage and may affect a lower income individual's choice of beverage to a greater extent.^{11,13} Increased price-driven consumption, especially by lower income individuals, may increase obesity prevalence.¹⁰⁻¹³ Given the slightly larger price difference between healthy and unhealthy beverages in lower compared to higher per capita income areas and the fact that lower per capita income areas

tend to be more greatly affected by price differences, it is possible that price factors are contributing to the greater obesity prevalence in lower per capita income areas in O'ahu.¹³

The mean price of water was cheaper per 20 ounces than the mean price of unhealthy beverages. However, one reason unhealthy beverages may be consumed more than water and other healthy beverages is that unhealthy products are advertised more than healthy products.^{16,17} Increasing the advertising of healthy beverages (including water) while decreasing the advertising of unhealthy beverages (including sweetened coffee and energy drinks) may assist in reducing the prevalence of obesity.

This study has several limitations. Only four different areas in O'ahu were sampled in this study, so the data may not be representative of the entire state of Hawai'i. Further, beverage prices from each outlet were only assessed once and prices change over time.

In conclusion, the mean price of healthy beverages was significantly higher than the mean price of unhealthy beverages in four areas sampled on the island of O'ahu. Other studies have shown that unhealthy sugar-sweetened beverages may be positively associated with weight gain^{6, 8} and that beverage prices affect what individuals consume and may affect lower per capita income individuals to a greater extent.^{11, 13} Hence, a pricing strategy in Hawai'i that enables healthy beverages to be less expensive than unhealthy beverages may influence individuals, especially those with lower incomes, to consume fewer unhealthy beverages and could reduce obesity in the state of Hawai'i.^{10,13}

Conflict of Interest

None of the authors identify any conflict of interest.

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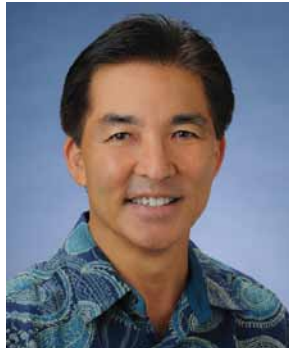
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Breastfeeding Patterns in the Rural Community of Hilo, Hawai'i: An Exploration of Existing Data Sets

Jeanie L. Flood PhD, RN, IBCLC

Abstract

Before any breastfeeding promotion effort, an understanding of the existing breastfeeding patterns is essential. Hawai'i County is a rural, ethnically diverse, medically underserved community. The purpose of this study was to describe the breastfeeding patterns of women living in Hilo, Hawai'i. Data from several existing national, state, and local data sets were accessed to identify and describe the breastfeeding patterns of women in this community. Available breastfeeding data about women in Hilo was obtained from the Hawai'i WIC program and includes initiation, duration, exclusivity of breastfeeding, and reasons for not breastfeeding. These data were compared to data from published reports available at the county, state, and national level. The State of Hawai'i and Hilo exceed national targets for breastfeeding initiation; however, rates soon drop following delivery, and mixed feedings of infants is common. The highest percentage of mothers weaned their infants within the first four weeks postpartum. The reasons the majority of the mothers gave for weaning were tied to breastfeeding situations that are amenable to skilled lactation support (eg, milk supply issues and latch or sucking problems). While available data sets offer valuable information on the breastfeeding patterns in this rural community, there are limitations to their usefulness, primarily due to the inconsistent operational definitions of infant feeding variables used in the surveys, and the lack of availability of community level data.

Introduction

Despite recommendations from government and health organizations, the duration of breastfeeding in the United States is still below desired levels.¹ The Healthy People 2020 targets recommend that 81.9% of mothers initiate breastfeeding, 60.6% breastfeed for at least six months postpartum, and 34.1% continue breastfeeding through 12 months after delivery.¹ In a recent news release, the Surgeon General of the United States released a Call to Action to support breastfeeding which identifies specific ways that communities, families, and health professionals can increase support for breastfeeding.²

The Island of Hawai'i is the largest island geographically in the state with a land mass of 4,028 square miles. It has the second largest county population; however, it has the lowest population density per square mile in the State.³ Hilo is the setting for this study and the largest city on the island with a population of 42,916, and is on the eastern and windward side of the island. Economically, Hilo has lower household income and higher poverty rates than either the State of Hawai'i or the United States.⁴ and lower household income than the northern and western regions of the island.⁵

An important factor that may be influencing breastfeeding rates reported for Hilo is access to breastfeeding support. The availability of information and resources that support breastfeeding infants may help women to initiate and to prolong duration of breastfeeding.⁶ An analysis of recent data from the Centers for Disease Control and Prevention (CDC) focused on breastfeeding support revealed that the State of Hawai'i scored lowest in the nation for breastfeeding support after

hospital discharge.⁷ Moreover, the availability of breastfeeding services may be more limited in rural settings in the State. The geographic setting of Hilo is classified as a rural region, which creates particular difficulties with access to health care that can result in suboptimal services to support breastfeeding. The purpose of this study is to gain a better understanding of a local community's breastfeeding patterns, specifically Hilo, Hawai'i.

Methodology

The present research report is the first part of a larger ethnographic study that explored breastfeeding support and service needs of women in Hilo, Hawai'i. Approval for this research was obtained from the Institutional Review Board (IRB) at the University of Hawai'i at Manoa prior to data collection.

To understand the characteristics and breastfeeding patterns of women living in Hilo, several existing national, state, and local data sets were used to describe breastfeeding patterns of women. The goal of the analysis was to access data at the lowest level possible (ie, community) when available and compare with state and national data to gain an understanding of community breastfeeding patterns. An effort was made to compare like data (ie, indicator, year) and triangulate findings among different data sets when direct comparisons were not possible. State and County level data were obtained from surveillance systems through review of published reports and online websites from the Pediatric Nutrition Surveillance System (PedNSS), the National Immunization Survey (NIS), and Hawai'i Pregnancy Risk Assessment Monitoring System (PRAMS).

The PedNSS is a program-based national surveillance system that monitors the nutritional status of low-income infants, children, and women in federally funded maternal and child health programs. Data are collected at the individual clinic sites. The data are then aggregated at the state level and submitted to the CDC.⁸ For this study, data for the State of Hawai'i and National estimates from 2009 were used to describe breastfeeding rates. National data from PedNSS is available at <http://www.cdc.gov/breastfeeding/data/index.htm>, and Hawai'i State data was obtained from the Hawai'i WIC program.

The NIS consists of two parts: a random dialed telephone survey to households and a mailed survey to immunization providers to monitor childhood immunization coverage.⁹ Starting in 2001, breastfeeding questions were added to the telephone survey to assess breastfeeding practices. Data collected from the NIS is used for the CDC Breastfeeding Report Card 2010 and current data on Healthy People 2020 breastfeeding goals.¹⁰ Data from NIS from births in 2007 were used to describe State of Hawai'i and national estimates on breastfeeding and supplementation

rates and is available at <http://www.cdc.gov/breastfeeding/data/index.htm>.

PRAMS is a population based surveillance system that collects data from mothers on indicators before, during, and shortly after their pregnancy. The questionnaires include core questions developed by the CDC and Hawai'i state-developed questions.¹¹ Every month a stratified random sample is drawn from the birth certificate files of live births that have occurred two to three months prior to the random sampling process. PRAMS data is only available at the state and county level. The PRAMS trend report for the State of Hawai'i, reported data for breastfeeding for at least 8 weeks which was aggregated for the time period from 2004-2008 to generate "stable estimates for the individual estimates by county, race, and maternal age groups."¹² Additional PRAMS data on breastfeeding initiation and exclusivity were obtained from the Hawai'i Department of Health Family Health Services Division Breastfeeding Fact Sheets.¹³

Data were collected directly from Hawai'i Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on a number of breastfeeding indicators including initiation and duration rates, supplementation, and reasons for weaning. WIC is a federally funded program that provides supplemental foods, nutritional education, and breastfeeding promotion to low-income, nutritionally at risk women and children.¹⁴ Eligibility is limited to women who live at or below the 185% Federal Poverty Level (FPL). Data, including general information on breastfeeding, are collected from participants at each visit and entered in a local and statewide database. Data on breastfeeding at the local level was obtained directly from Hilo WIC office and the State Department of Health WIC Services Branch. Data on exclusive breastfeeding mothers was obtained by month and represents the proportion of mothers in WIC who were currently exclusively breastfeeding. Additionally, data on factors influencing premature weaning were also obtained and evaluated by time since birth. A WIC participant is asked for reasons why they stopped breastfeeding and include such options as "not enough milk." The top three reasons by months postpartum are reported in this study by three time periods: less than one week postpartum, one to four weeks postpartum and four to ten weeks postpartum. The WIC data is the only maternal-child health data provided to the CDC by Hawai'i for the generation of the standard PedNSS reports; therefore, the PedNSS and WIC data reported in this study should be similar to one another.

Results

Breastfeeding Initiation

Data on breastfeeding initiation were available from several data sets at national, state, county, and community level. Data varied on years available and indicator. The only data sets with breastfeeding initiation rates specific to Hilo were available from the Hilo WIC program directly, and CDC through the PedNSS (2009) provided by the Hilo WIC program; the two data sets, as noted earlier, are directly comparable. Table 1 contains PedNSS/

WIC data on breastfeeding prevalence ("ever breastfed") for the year 2009. Based on Healthy People 2020 targets, Hilo (82%) and the State of Hawai'i (84%) both appear to meet the target for initiating breastfeeding (81.9%).¹⁵ Data available from WIC showed that breastfeeding rates varied across Hawai'i County with Hilo having lower rates of "ever breastfeeding" than other parts of the Island.

State level data from the NIS was available for the year 2007 and showed a State of Hawai'i breastfeeding initiation rate of 87.5% meeting the Healthy People 2020 target (81.9%).¹⁶ State level breastfeeding initiation data were also available through PRAMS. PRAMS data shows that the rate of breastfeeding initiation for the State of Hawai'i increased from 89.1% in 2000 to 92.2% in 2008 (data not shown in Tables),¹³ well above the target rate. PRAMS data also contained information on "never breastfeeding" at the county level for aggregated data from 2004-2008. The percentages varied across the State with Hawai'i County having higher rates of mothers who had never breastfed (11.8%, 95% CI 10.5%-13.2%), than Honolulu (9.4%, 95% CI 8.9%-10.1%), Maui (7.7%, 95% CI 6.6%-9.0%), or Kaua'i (6.7%, 5.1%-8.6%) or the State of Hawai'i (9.4%, 95% CI 8.9%-9.9%; data not shown in Tables).¹³

Breastfeeding Duration

Data on breastfeeding duration were available from several data sets with breastfeeding rates specific to Hilo available from the Hilo WIC program directly, and CDC through the PedNSS (2009) provided by the Hilo WIC program. The indicators were breastfeeding continuation at 6 and 12 months postpartum ("breastfeeding duration of 6 months," and "breastfeeding duration of 12 months"). Table 1 contains PedNSS/WIC data on breastfeeding duration for the year 2009. Based on Healthy People 2020 guidelines, Hilo and the State of Hawai'i both are below target, but are still higher than the national levels. NIS data, which is more representative of the State than WIC or PedNSS data, showed rates of breastfeeding duration closer to target levels (see table 2). Overall, the State, county, and local data available indicate State of Hawai'i and Hilo falling short of meeting duration targets.

Breastfeeding Exclusivity

Much of the data on breastfeeding duration does not include information on the actual amount of breastfeeding (ie, breastfeeding exclusivity). Three data sources with data on breastfeeding exclusivity were state level data from the NIS, PRAMS, and WIC data for Hilo and Kona. The NIS state level data shows the State of Hawai'i meeting the Healthy People 2020 target goals for exclusive breastfeeding through 3 months, but falling short of the target for exclusive breastfeeding through 6 months (see Table 2).

Exclusive breastfeeding varies across the Island of Hawai'i with monthly reports from WIC showing consistently higher exclusive breastfeeding rates in Kona compared with Hilo. For example, in June of 2010, the Kona WIC office reported that 33% of all infants served were exclusively breastfeeding while

BF Rates	Hilo n (%) ^a	Honoka'a n (%) ^a	Waimea n (%) ^a	State of Hawai'i n (%) ^b
Ever Breastfed	475 (82.0)	52 (92.9)	141 (89.2)	8,488 (84.4)
Breastfed at least 6 months	198 (38.8)	23 (51.1)	75 (52.5)	4,505 (41.3)
Breastfed at least 12 months	168 (31.5)	15 (35.7)	59 (40.4)	7,754 (22.3)

BF = breastfeeding; WIC = The Special Supplemental Nutrition Program for Women, Infants, and Children; n refers to the number of respondents in the survey.

^a Data collected by the WIC Office in Hilo

^b PedNSS data provided by the State of Hawaii WIC Office

	State of Hawai'i %	United States %	Healthy People 2020 Targets ^a
Ever Breastfed	87.5±5.4	75.0±1.2	81.9%
Breastfeeding at least 6 months	60.4±7.3	43.0±1.3	60.6%
Breastfeeding at least 12 months	33.1±6.7	22.4±1.1	34.1%
Exclusive Breastfeeding through 3 months	42.3±7.4	33.0±1.2	46.2%
Exclusive Breastfeeding through 6 months	16.0±5.5	13.3±0.9	25.5%

^a US Department of Health and Human Services, 2010

Reason for Weaning	Breastfeeding Duration		
	< 1 wk n (%)	> 1 -4 wks n (%)	4 - 10 wks n (%)
Baby or mom sick	4 (8.5)	12 (9.8)	4 (8.0)
Baby preferred bottle	15 (31.9)	19 (15.5)	15 (30.0)
Breast pain/problems	1 (2.1)	6 (4.9)	1 (2.0)
Latch on or sucking problem	19 (40.4)	22 (17.9)	1 (2.0)
No time, not convenient	0	11 (8.9)	1 (2.0)
Not enough milk	5 (10.6)	38 (30.9)	11 (22.0)
Return to work/school	1 (2.1)	7 (5.7)	16 (32.0)
Right time to wean	0	0	0
Other	0	8 (6.5)	1 (2.0)
Total	47 (15.6)	123 (40.7)	50 (16.56)

^a Data Reported by the WIC Office in Hilo

Formula Supplementation	State of Hawai'i percent +/- standard error	United States percent +/- standard error
Before 2 days	26.3±7.2	25.4±1.4
Before 3 months	38.3±8.3	37.2±1.8
Before 6 months	46.6±9.5	43.8±2.0

Formula supplementation is defined as supplementation of breast milk with formula (with or without other supplementary liquids or solids) among infants breastfed at the age specified (2 days, 3 months, or 6 months).

Hilo reported that 22% of all infants served were exclusively breastfeeding (data not shown in Tables).¹⁷ PRAMS also includes data on breastfeeding exclusivity. State of Hawai'i PRAMS data for the years 2004 through 2008 showed 39.8 % of mothers who initiated breastfeeding did so exclusively for at least eight weeks (data not shown in Tables).¹³

Factors Influencing Premature Weaning

The Hawai'i WIC program collects information about the reasons for weaning and the age of weaning, and includes data

specific to those served by Hilo WIC. In 2009, the three most common reasons given by WIC mothers for weaning an infant were not enough milk (25.5%), the baby preferred a bottle (21.5%), and latch or sucking problems (14.9%; see Table 3). The most frequent period for weaning an infant was between one and four weeks postpartum (40.7%) with 16% of mothers breastfeeding less than one week. "Latch or sucking problems" were cited as being the most common reason (40.2% of mothers) for weaning within the first week postpartum. Similarly, between one and four weeks postpartum, 30.8% of mothers

stopped breastfeeding because they thought that they did not have enough milk for their babies.¹⁸

Supplementation

Data for supplementation rates were available at the State level from the NIS (Table 4). Approximately one quarter of breastfeeding mothers in Hawai'i are supplementing breastfeeding within two days of birth with the number increasing to nearly 50% by six months. The State of Hawai'i rates for formula supplementation are similar to national levels.

Discussion

Summary of Findings

Based on the analysis of the available data sets, the State of Hawai'i and Hilo are meeting target rates for breastfeeding initiation set out by the federal government.¹ New national targets have been established in Healthy People 2020 (HP2020), which have increased the recommendations for breastfeeding initiation. Based on the most recent data for breastfeeding initiation, the Hawai'i State and Hilo initiation rate of 89.1% continues to exceed the national average (73.9%) according to Healthy People 2020.¹⁰

Rates of breastfeeding duration are perhaps a more useful indicator of community breastfeeding patterns. The benefits of breastfeeding are described as dose dependent, which is why duration has been a focus within many data sets. The federal guidelines for breastfeeding duration for HP2020 have increased; target duration rates are 60.6% at six months and 34.1% at one year.¹ Based on current targets, the majority of national surveys report that the State of Hawai'i is close to six month and one-year target breastfeeding rates but lower for rates of exclusive breastfeeding.

In examining the Hilo WIC data, the majority of mothers are initiating breastfeeding, but duration rates drop below national recommendations. For example, the HP2020 target for breastfeeding duration of at least 6 months is 60.6% whereas only 38.8% of Hilo WIC mothers are breastfeeding at 6 months. Note, however, that WIC mothers throughout the State of Hawai'i failed to meet HP2020 targets for this particular indicator (41.3%) although regional differences in breastfeeding duration are notable, whereas the national target is achieved for the State of Hawai'i based upon a representative sample of mothers responding to the NIS. These discrepancies between Hilo vs. the State of Hawai'i, and WIC data vs. data from representative surveys both need to be considered to draw meaningful conclusions. First, the data shows that in general, mothers enrolled in the WIC program initiate breastfeeding at rates comparable to Hawai'i mothers, and achieve HP2020 targets for breastfeeding initiation. However, they perform worse than a representative sample of Hawai'i mothers, and fall below national targets, in breastfeeding duration. Second, although Hilo's WIC data is comparable to the state's WIC data, arguably Hilo's WIC data is more representative of breastfeeding among Hilo mothers than the state's WIC data is representative of the State of Hawai'i's mothers; this is because poverty levels in Hawai'i county in

general, and Hilo in specific, are higher than in the State of Hawai'i,^{4,5} resulting in a greater proportion of the population being eligible for WIC services. Nevertheless, the comparability of WIC data to nationally representative data must be considered as this data is evaluated.

According to the Hilo WIC, the highest percentage of mothers weaned their infants within the first four weeks postpartum. The reasons the majority of the mothers gave for weaning were tied to breastfeeding situations amenable to skilled lactation support (eg, milk supply issues and latch or sucking problems).¹⁹ This is consistent with the findings of researchers examining reasons for weaning among a broad spectrum of populations.² The NIS data shows that a quarter of breastfeeding mothers in the State of Hawai'i supplemented with formula by two days of age with this percentage increasing over the next six months.⁸ The introduction of formula decreases the amount of breast milk an infant receives, reduces breast milk production by their mothers, and may lead to early weaning.²

The recent Call to Action from the Surgeon General outlined steps to remove obstacles faced by women who want to breastfeed.² WIC, a federal program, has frequently been mentioned in the literature as a deterrent to breastfeeding due to the provision of formula.^{20,21} An attempt to ameliorate this situation has been mandated and operationalized through increased breastfeeding promotion by WIC staff and increased availability of breast pumps; however, the contradiction cannot be reconciled entirely. Recent increases to the food packages for breastfeeding mothers are another attempt to promote breastfeeding through WIC. The new packages were created to better "support the establishment of successful, long-term breastfeeding" but research is needed to determine the impact of these changes, if any, on breastfeeding duration.²² In one study with WIC participants in Louisiana, researchers found that significantly more mothers "reported that incentives provided to encourage breastfeeding did not affect their decision to breastfeed than those who said incentives affected their decision to breastfeed."²³ It is difficult to see how an agency that depends on funding from formula companies can truly be perceived as supportive of breastfeeding.²⁴

Limitations

PRAMS, NIS, PedNSS, and WIC data sets were accessed to explore breastfeeding patterns in the Hilo, Hawai'i community. A major limitation to the analysis was that community level data was limited to WIC data, which as noted earlier may be limited in its true representativeness of the Hilo community. While these data sets offer valuable information on the breastfeeding patterns in this rural community, several limitations to their usefulness in understanding the patterns of infant feeding in Hilo became obvious.

Operational Definitions of Key Variables

Measurement of breastfeeding varied among different surveys and these measurements are not necessarily reflective of what constitutes appropriate breastfeeding. International organizations concerned with breastfeeding have attempted

to standardize definitions of different levels of breastfeeding by creating frameworks to further define different levels of breastfeeding but no consensus currently exists.^{25,26} The use of the term breastfeeding alone is not sufficient to describe different patterns in breastfeeding behaviors (eg, partial, mixed, exclusive, token).²⁷ Many of the existing survey questions do not gather information about the frequency of breastfeeding per day or the duration of exclusive breastfeeding, which may better assess breastfeeding.

The problem with potentially inaccurate and misleading measurement concerning breastfeeding is highlighted by the following example from the NIS survey. One of the questions asked of respondents is: “Was [child] ever breastfed or fed breast milk?”¹⁶ In this survey, there is no attempt to quantify the frequency of feedings. A mother might have breastfed once in the span of her hospital stay and be counted as a breastfeeding mother. The variations in the wordings of the survey questions between the different surveys could also cause a mother to give different answers for the same breastfeeding outcome measure.²⁸ Therefore, the high rates of breastfeeding initiation found in the Hawai‘i statistics do not provide an accurate picture of the actual quantity of breastfeeding. It appears that mothers may be attempting to breastfeed but it is unclear how much actual exclusive breastfeeding is occurring and the duration of breastfeeding is not assessed well, particularly at the local community level. One national survey did collect data about exclusive breastfeeding. According to the NIS data for the State of Hawai‘i, breastfeeding at six months was 60%, but the exclusive breastfeeding rate at six months was 16%, well below target levels.¹⁶ The analysis of data sets would be more meaningful if breastfeeding was more accurately quantified. The rapid drop off in rates for duration of breastfeeding suggests that something detrimental happens between breastfeeding initiation and breastfeeding duration outcomes.

The variability in the operational definitions of breastfeeding makes it difficult to make comparisons across data sets. It also makes it difficult to interpret breastfeeding research and apply evidence-based findings to practice.²⁶ For example, an infant whose diet contains 100% breast milk compared to an infant whose diet contains 50% or less breast milk and 50% or more artificial milk are likely to have very different health outcomes.²⁵ According to Labbok,²⁶ “Policy-makers and HCPs must be very clear concerning what patterns of feeding we recommend based on the definition used in the articles that convinced us.”

Lack of Community Level Data

For many of the data sources examined, local data were aggregated into state data, which in turn were aggregated into national data sets, most often housed at the CDC. National and state data were more readily available for most surveys and for some indicators, were the only available level of data. This creates a problem when trying to understand infant feeding behaviors within smaller regions, as was the goal of this research.

For many data sets, the rates for all regions in the State of Hawai‘i are aggregated into one rate masking any regional

variations. Less available are data from within the counties. For example, one of the major data sources for Hawai‘i, PRAMS, cannot be disaggregated below the county level (ie, city level). The data from WIC were one of the few disaggregated sources available that facilitated an examination of breastfeeding rates within Hawai‘i County but are limited in their representativeness due to the eligibility requirements of WIC. Hilo WIC breastfeeding initiation rates meet national targets, whereas breastfeeding duration rates are dramatically lower. However, looking at WIC data on breastfeeding within Hawai‘i County, rates for the northern and western regions of the Island (ie, communities of Kona, Waimea, and Honoka‘a) are higher in all categories of breastfeeding activities than those reported for Hilo, suggesting that even among low income women, considerable geographic variations in breastfeeding patterns persist. These findings highlight the need to consider differences in geography and population distribution across the county and the importance of community level data in understanding breastfeeding patterns.

Conclusion

Prior to any breastfeeding promotion, it is important to gain an understanding of a community’s breastfeeding patterns. These data sets offered a valuable starting point for this study, but were limited in their usefulness for a thorough understanding of community breastfeeding patterns. The limited amount and quality of community level data combined with inconsistencies in breastfeeding definitions and different survey methodologies created an unclear picture of breastfeeding patterns. State data was often the only data available on which to gain an understanding. The high breastfeeding initiation rates may provide a false sense of how well Hawai‘i is meeting breastfeeding goals. Even though Healthy People 2020 targets are met for initiation, breastfeeding duration rates, at least in some lower income communities, may drop off below desired levels with even lower levels of exclusive breastfeeding.

The influences on breastfeeding decisions are multi-factorial and include maternal influences,²⁹ culture and contextual influences,^{30,31} and the health care system.^{19,32} Appropriate and timely breastfeeding services can improve breastfeeding exclusivity and duration.³³ In addition, the provision of ongoing support has been shown to increase the proportion of women who continued to breastfeed for up to six months.³⁴ Access to breastfeeding support services has become essential to increasing breastfeeding initiation and duration.⁶ The challenges of acceptance and support for breastfeeding in communities and larger society are complex and vary by region.

More research is needed to understand this community’s breastfeeding patterns and support and service needs. The second phase of this research is to include the voices of mothers and healthcare workers in Hawai‘i County to gain further understanding of breastfeeding patterns and support and service needs of the community. A quantitative exploration of breastfeeding rates in Hilo would shed light on the accuracy of existing government data set reports of breastfeeding initiation

and duration. Finally, deeper exploration of breastfeeding in other areas of the Island could help explain the differences in breastfeeding rates among regions in Hawai'i County.

Disclosure Statement

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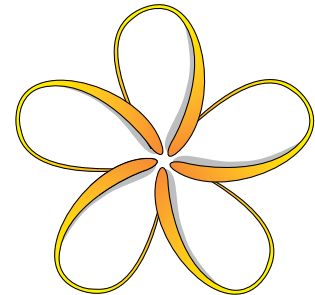
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Vitamin D Deficiency at Birth Among Military Dependents in Hawai'i

Eldon G. Palmer MD; Emmanuel Ramirez-Enriquez MD; Sarah M. Frioux MD; and Melissa M. Tyree MD

Abstract

Vitamin D has long been known to be essential in bone mineralization as well as calcium and phosphate regulation. An increasing body of literature suggests that Vitamin D is also key in many other areas to include immune function, brain development, prevention of autoimmune disease, and prevention of certain types of cancers. Studies also suggest that, with decreased sun exposure due to concern for skin cancer risk, much of the world's population is becoming increasingly deficient in vitamin D. Our hypothesis was that vitamin D deficiency exists, and can be detected, even in sunny climates such as the state of Hawai'i. To test this hypothesis, eighty-six cord blood samples were collected in the process of routine clinical testing. These samples were tested for 25-hydroxy vitamin D via liquid chromatography mass spectroscopy. Percent deficiency (<20ng/mL) and insufficiency (20-31.9ng/mL) were determined by statistical analysis. Forty-six percent (n=37) of cord blood samples tested were deficient in vitamin D; 47 percent (n=38) of samples had insufficient 25-OH vitamin D. Only 7 percent (n=6) of samples showed vitamin D concentrations at the recommended levels. A vast majority of military dependents in Hawai'i have less than optimal vitamin D levels at birth. Further investigation of vitamin D supplementation during pregnancy is required to optimize vitamin D status at birth. We conclude that a vast majority of military dependents in Hawai'i have less than optimal vitamin D levels at birth supporting the recommendation for supplementation in this population.

Introduction

Vitamin D is a fat soluble molecule which has been shown to play a key role in several physiologic processes both in animal models and in clinical research. Over the last three to four decades, the medical community has increasingly stressed the importance of avoiding ultraviolet B (UVB) radiation due to concerns for metastatic melanoma and other skin cancers. Recent studies and reviews continue to report the risks of sun exposure especially for pediatric and adolescent populations.¹ Alternately, sun exposure (and subsequent increases in Vitamin D) is increasingly tied to health benefits beyond the long known utility in prevention of rickets. In one study, those who had skin cancers presumably related to extensive sun exposure had significantly lower risks of cervical, esophageal, gastric, and rectal cancer than the general population.² Evidence also indicates that, in addition to modulation of risks of above cancers, multiple sclerosis, insulin dependent diabetes mellitus, autism and schizophrenia are increased in populations with lower sun exposure (and lower Vitamin D levels), particularly during late prenatal and perinatal periods leading some researchers to hypothesize that hypovitaminosis D induces risk-modifying imprinting early in life.³ Respiratory syncytial virus (RSV) infection, a major source of hospitalization and mortality in infants, occurs more frequently in patients with deficient 25-OH vitamin D cord blood levels at birth. Lower respiratory tract infection with RSV was 6 times more likely in infants with

cord blood levels <20ng/mL.⁴ Language delay has been noted to be more prevalent in children born to mothers with 25-OH vitamin D levels <18.5ng/mL compared to those >28ng/mL.⁵ The American Academy of Pediatrics (AAP) in 2008 increased the recommended intake of Vitamin D based on the occurrence of vitamin D deficient rickets at levels <20ng/mL. Intake at the new recommendation of 400IU consistently achieves levels >20ng/mL in children.⁶ Other, non-osseous, health implications such as those listed above still seem to be relevant at levels between 20 and 32 ng/mL (50 and 80nmol/L).⁷ An Endocrine Society guideline discusses deficiency and insufficiency ranges similar to those listed above in order to optimize potential extra-osseous benefits.⁸ Conversely, while the Institute of Medicine does recommend 400IU to maintain levels >20ng/mL to support optimal bone health, it does not endorse the idea of an "insufficiency" range as the evidence to support higher levels of vitamin D is limited.⁹

The purpose of our study was to determine the incidence of vitamin D deficiency and insufficiency as defined above at birth among dependents of military personnel stationed in Hawai'i. The team hypothesized that, given emphasis on minimizing direct sun exposure in the medical community and society at large, hypovitaminosis D would be prevalent even in a climate where significant sun exposure would be expected.

Methods

The study protocol was approved by the Human Use Committee at Tripler Army Medical Center. Investigators adhered to the policies for protection of human subjects as prescribed in 45 Code of Federal Regulation 46. Cord blood samples are routinely collected for screening of infants at risk for hemolytic disease of the newborn. Samples were refrigerated at 4 degrees Celsius for 2 days to 4 weeks in Ethylenediaminetetraacetic acid (EDTA) sample tubes until sufficient numbers had been collected for this study. Aliquots from 86 of these samples (collected in February and March 2012) were placed on blotter cards and sent to an outside laboratory for liquid chromatography mass spectroscopy analysis of 25-OH vitamin D2 and 25-OH vitamin D3 levels (ZRT Laboratory, Beaverton, OR).

As part of our methods validation, we tested 10 cord blood samples within 48 hours of original collection. Aliquots of these same samples were stored in centrifuge tubes for 3 weeks at 4 degrees Celsius. At the end of three weeks they were manually homogenized (shaken) and they were again tested using the sample cards described above. The mean drop in 25-OH vitamin D over the 3 weeks was 10 percent (median 7.4 percent).

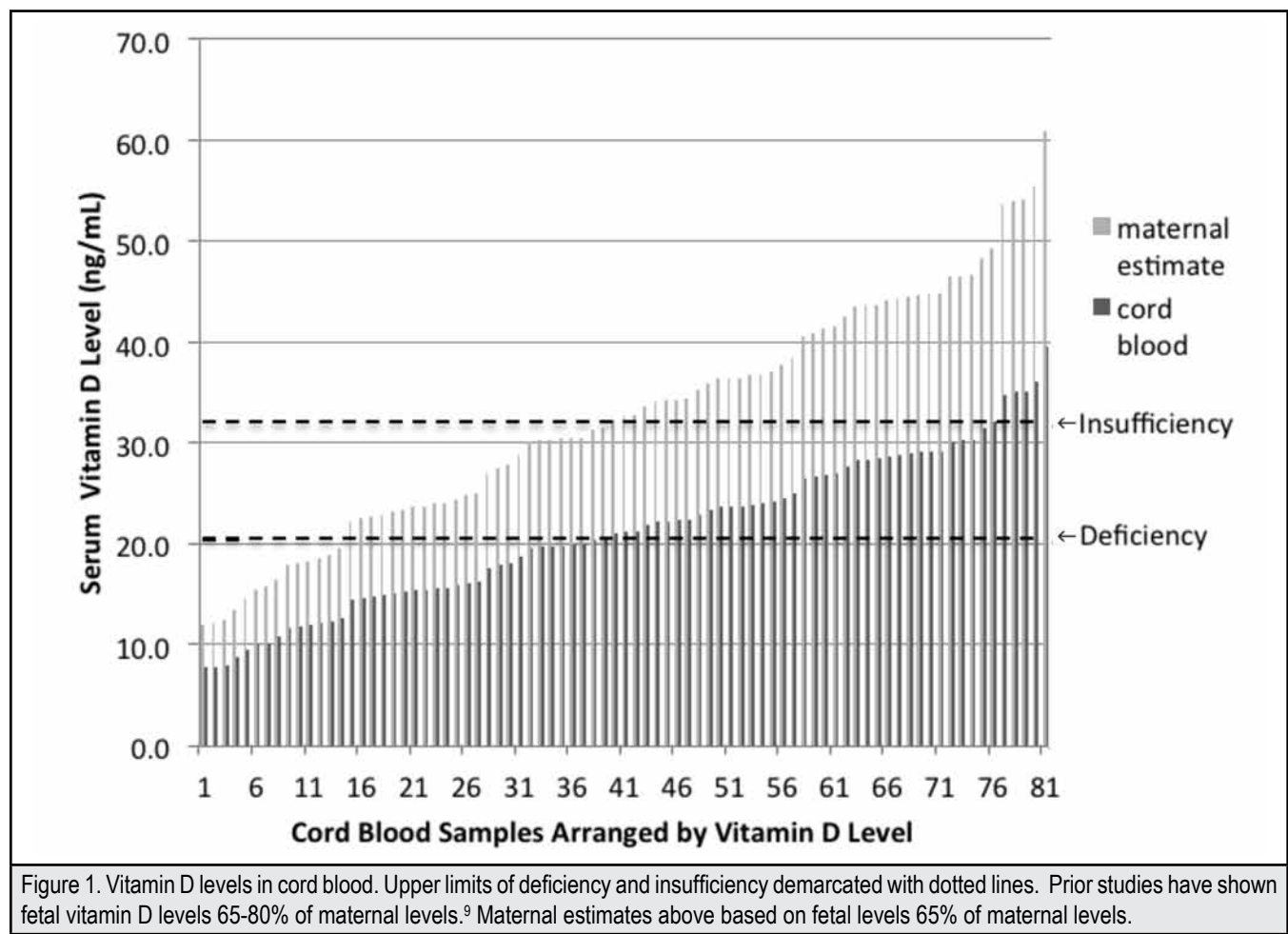
As fetal levels of 25-OH vitamin D have previously been measured to be 65-85 percent of maternal levels¹⁰, cord blood levels were divided by a factor of 0.65 for a conservative estimate of the incidence of maternal deficiency in this population. As discussed above, deficiency was defined as a level <20ng/mL (50nmol/L) and insufficiency as a level 20-32ng/mL (50-80nmol/L).

Results

Five of the 86 cord blood samples were excluded for processing reasons (4 with clots on card, one with an otherwise unusual appearance to blood spot) resulting in a total of 81 samples available for analysis. None of the 81 samples had any significant amount of 25-OH vitamin D₂. The median 25-OH vitamin D₃ level was 21.1 with a mean of 21.2 (SD 7.5) and a range of 7.7-39.6. Blood levels indicating deficiency of vitamin D were detected in 46 percent (n=37) of samples. Insufficiency was found in 47 percent (n=38) with only 7 percent (n=6) indicating sufficiency. Estimates of maternal deficiency and insufficiency were 17 percent (n=14) and 31 percent (n=25) respectively (See Figure 1).

Discussion

The American Academy of Pediatrics has recommended providing supplemental vitamin D to exclusively breastfed infants for decades. In 2008, the recommended amount was increased from 200IU to 400IU with an emphasis to start within the first few days of life,⁵ yet in a recent survey of pediatricians in Seattle, Washington less than half of pediatricians recommended supplemental vitamin D for all exclusively breastfed infants in their practices.¹¹ Military physicians had a higher compliance with the guidelines (89% of pediatricians, 63% of family practitioners) with 65 percent of those who were non-compliant citing a belief that there was adequate sun exposure in their geographic area so that supplementation was not indicated.¹² Similar barriers to supplementation exist in Hawai'i. At a recent symposium on metabolic bone disease in Hawai'i, many pediatricians in attendance admitted that they did not routinely recommend vitamin D supplementation because of the likely high amount of sun exposure among their patients. A majority of neonates cared for in civilian neonatal intensive care units (NICU) in Hawai'i do not receive supplementation of vitamin D beyond that found in the breast milk fortifiers and in premature infant



formula. The result of this practice is that few, if any, infants in the NICU receive the recommended daily 400IU of vitamin D. Our results indicate that such practices likely prolong the duration of vitamin D deficiency in these high risk infants, potentially putting them at increased risk for language delay and other morbidities discussed above.

The primary limitation of our study was the unanticipated decline in vitamin D level over time. Prior studies have shown stability of vitamin D under various conditions including storage in serum only at -25°C for up to 40 years,¹³ in whole blood for 3 days at room temperature, or for 10 years at -20°C,¹⁴ however, storage in whole blood for more than 3 days at 4°C has not previously been validated. Given our findings of a decline in vitamin D levels over time, storage in serum only may be preferable. Acknowledging this limitation, one could postulate up to a 10 percent underestimation of 25-OH vitamin D levels in our study, which would suggest that the true levels of deficiency and insufficiency may be somewhat lower than those reported in this study.

It is of note that February has been previously described as the peak incidence of vitamin D deficiency in cord blood.⁴ As this is the time frame when most of our samples were collected, it is possible that our results represent a peak incidence of vitamin D deficiency in our population. While there is potentially less seasonal variability of sun exposure and vitamin D levels in Hawai'i due to low latitude and more temperate climate, because of winter clouds and rain, it is possible that significant variability persists. In addition, as the military is a transitory population and vitamin D has a long half life in vivo due to storage in adipose tissue, it is possible that some of the seasonal effect from other geographic locations carried over into Hawaii. A future study could include this demographic data to assist in estimating the incidence of vitamin D deficiency in the non-migratory population.

Our study results are consistent with prior studies that demonstrate that deficiency can occur even in sun-rich environments at low latitudes. Dror, et al, reviewed several studies demonstrating 40-96 percent vitamin D deficiency in cord blood samples in latitudes ranging from 40 degrees south to 40 degrees north.⁹ Prior studies specific to Hawaii (21° N) include a study in adults with sun exposure >15 hours per week which demonstrated that nearly 10 percent of individuals were in deficient range (<20ng/mL) with an additional 40 percent in the insufficient range (20-30mg/mL).¹⁵ While the exact reason for the deficiency despite adequate sun exposure is unclear, it has been established that skin type and increased skin melanin after sun exposure affect the synthesis of previtamin D3 and serum levels of vitamin D3.¹⁶

The lack of vitamin D2 in our population is interesting. Historically, vitamin D2 (a fungal derivative also known as ergocalciferol) had been the predominant nutritional supplement. Vitamin D2 is also present in raw mushrooms. With some studies¹⁷ showing increased efficacy and potency of vitamin D3 (an animal derivative also known as cholecalciferol), supplementation has shifted to preferential use of vitamin D3

in products such as prenatal vitamins. Vitamin D3 is also the form generated when human skin is exposed to ultraviolet radiation. Our results indicate that our population does not have significant exposure to dietary vitamin D2.

Conclusion

Vitamin D deficiency is prevalent at birth among military dependents in the state of Hawaii. Maternal deficiency is also likely to be high. Providers in sunny climates should be made aware that vitamin D deficiency is still a concern and recommendations such as those of the AAP to provide 400IU of vitamin D daily within a few days of birth should be strictly adhered to. Additional research is needed to elucidate which, if any, subgroups may already be sufficient in vitamin D and may not need prescribed supplementation. Large randomized controlled studies are needed to determine which of the negative health associations with vitamin D deficiency or insufficiency can be prevented with consistent vitamin D supplementation in pregnancy and infancy.

Disclaimer

The views expressed in this manuscript are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the US Government.

Disclosure

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Conflicts of Interest

The authors have no conflicts of interest, financial or otherwise to disclose in relation to the material discussed in this article.

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Recent Trends in Adolescent Alcohol Use in Hawai'i: 2005-2011

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Abstract

Monitoring trends in adolescent alcohol use over time is important for planning, allocation of resources, and evaluation of alcohol prevention and treatment programs. This article is an update of previously reported trends in adolescent alcohol use in the State of Hawai'i utilizing data from the Centers for Disease Control and Prevention's Youth Risk Behavior Survey. Five alcohol use indicators were investigated between 2005 and 2011 including lifetime use, onset age, current use, binge drinking, and drinking on school property. Youth in Hawai'i generally reported worse alcohol behaviors in 2009 compared to 2007 but better alcohol use behaviors were observed in 2011 compared to 2009. This trend was not observed on the national level and thus may represent changes unique to Hawai'i. These apparent changes in alcohol use among adolescents highlight the need for resources and for continued surveillance.

Introduction

There are many negative effects of early onset drinking in adolescence including an increased likelihood of having problems in school, becoming involved in crimes, sustaining injuries, being in a motor vehicle crash, and death.¹⁻⁸ In addition, adolescent drinking is associated with an increased probability of problem drinking later in life. Early onset drinking before age 15 increases the risk of alcohol dependence by four times compared to those who delayed drinking until at least age 21.⁹ The US Surgeon General has declared alcohol as the preferred substance used among adolescents, exceeding tobacco or illicit drugs.¹⁰ In 2011, the prevalence of 30 day alcohol use among adolescents in Hawai'i was lower compared to youth in the United States (29.1% vs 38.7%, respectively).¹¹ In addition, the prevalence of youth binge drinking, defined for youth as having 5 or more drinks on a single occasion, in the past 30 days was lower in 2011 among Hawai'i's youth compared to the United States (15.4% vs 21.9%, respectively). However, the prevalence of binge drinking among adults in Hawai'i in 2009 was higher compared to adults in the United States (21.5% vs 18.3%, respectively).¹²

The Healthy People 2020 objectives include goals of increasing the proportion of adolescents never using substances, including alcohol, tobacco, and other illicit drugs, increasing the proportion of students who disapprove of and perceive great risk in using substances, decreasing the proportion of adolescents engaging in binge drinking, and decreasing the number of deaths attributable to alcohol.¹³ Therefore, it is important to understand the trends in alcohol use among adolescents in order to tailor and evaluate alcohol prevention programs. The Youth Risk Behavior Surveillance System (YRBSS) monitors health risk behaviors among adolescents in the United States. The YRBSS focuses on six types of risk behaviors contributing to morbidity and mortality among adolescents including violence and injury causing behaviors, tobacco use, physical inactivity, unhealthy dietary behaviors, sexual behaviors, and

alcohol and other drug use. The YRBSS data is collected from schools around the United States in local, state, and national surveys. This data can be used in many ways to track the health behaviors of adolescents, including alcohol use, to identify new trends in risk behaviors and to monitor progress of prevention programs.¹⁴

Alcohol use among adolescents in the State of Hawai'i has been previously investigated using data from the Hawai'i State Youth Risk Behavior Survey (YRBS) from 1993 to 2007.¹⁵ Trends were examined for five alcohol use indicators including lifetime use, onset age, current or recent use, binge drinking, and drinking on school property for Hawai'i adolescents in the 9th through 12th grade. Decreasing trends in all alcohol use indicators over time were revealed for all grade levels except the 12th grade. Significant overall decreasing trends were observed for "ever having tried alcohol" as well as for "having one's first drink of alcohol before the age of 13." Among 9th graders, the prevalence of binge drinking, drinking in the past 30 days prior to the survey, and drinking on school property also significantly decreased from 1993 and 2007. There were no significant decreases in the prevalence of any of the five alcohol use indicators among students in the 12th grade. In contrast, a significant increase in drinking on school property between 1993 and 2007 was reported among 12th graders in Hawai'i. These results indicate a positive change in alcohol use behaviors among the majority of Hawai'i's youth between 1993 and 2007 and suggest that alcohol prevention efforts may have been largely successful, especially among younger youth.

Continuous monitoring of adolescent alcohol use is important to understand trends and improve prevention programs. There have been previously reported observed changes over time in adolescent alcohol use in Hawai'i. These observed changes highlight the need for continued surveillance and analysis of adolescent alcohol use. This article presents recent data from 2009 and 2011 as an update to the previously reported trends. This data is valuable for the continued tracking of adolescent alcohol use in Hawai'i.

Methods

Data Collection

The YRBS is a biennial, nationwide survey of adolescents, grades 9-12, administered by the Centers for Disease Control and Prevention (CDC) as part of the YRBSS. The self-reported survey has been administered in public schools in Hawai'i since 1991. The YRBS measures the prevalence of a variety of risk factors, including alcohol use and factors relating to alcohol use. A comprehensive description of YRBS procedures is reported elsewhere.¹⁶ Data were collected for the YRBS in

Hawai'i among public school students in 2005 (N=1,662), 2007 (N=1,191), 2009 (N=1,511), and 2011 (N=4,329).¹⁷ The response rates (number of surveys returned) were at least 60% for each year, which is a CDC requirement for the data to be weighted. The national YRBS was collected among public and private school students in 2005 (N=13,917), 2007 (N=14,041), 2009 (N=16,410) and 2011 (N=15,425).¹⁸

Measures

The questions used across 2005, 2007, 2009, and 2011 were: (1) During your life, on how many days have you had at least one drink of alcohol, other than a few sips?; (2) How old were you when you had your first drink of alcohol other than a few sips?; (3) During the past 30 days, on how many days did you have at least one drink of alcohol?; (4) During the past 30 days, on how many days did you have at least five or more alcoholic drinks in a row?; and, (5) During the past 30 days, on how many days did you have at least one drink of alcohol on school property? Responses to the five questions were used to create outcome variables as follows:

Lifetime use: those who have had at least one drink of alcohol on at least one day during their life versus those who have not; **Onset age:** those who had their first drink of alcohol before age 13 versus those who had their first drink at age 13 or later;

Current use: those who had at least one drink of alcohol on at least one day during the 30 days before the survey versus those who had not drunk during the previous 30 days.

Binge drinking: those who had five or more drinks of alcohol in a row, that is, within a couple of hours, on at least one day during the 30 days before the survey versus those who had not.

Drinking on school property: those who drank at least one drink of alcohol on school property on at least one day during the 30 days before the survey versus those who had not.

Data Analysis

The YRBS website, Youth Online, supported by the Division of Adolescent and School Health at the CDC, offers an online interactive analysis tool of survey results stratified by region, survey year, and demographic characteristics.¹⁹ For analysis, this interactive tool was used to compare results from all four survey years in Hawai'i and to compare Hawai'i results to national data. Data was stratified by grade level and sex, and comparisons were made for the time period from 2005 to 2011. Comparisons were also made by ethnicity, using YRBS data from the Hawai'i Health Data Warehouse.¹⁷ Data on alcohol behaviors from the 2005, 2007, 2009, and 2011 surveys were compared in order to determine trends over time for the state of Hawai'i. Confidence intervals were compared to determine statistically significant changes. Institutional review board approval was granted by the University of Hawai'i at Manoa.

Results

Hawai'i State and National Trends (Table 1)

Overall, the prevalence of reported adolescent alcohol use in the State of Hawai'i was significantly lower compared to the

Hawai'i				
Indicator	Percentage (95% CI)			
	2005	2007	2009	2011
Ever Drank	64.8† (60.2-69.0)	58.7† (52.6-64.6)	68.6* (65.3-73.3)	55.8**† (52.6-59.1)
Drink Before Age 13	27.3 (23.7-31.3)	21.0 (17.6-24.9)	28.6*† (25.2-32.4)	19.2** (18.0-20.5)
Current Drinker	34.8† (30.8-38.9)	29.1† (23.7-35.3)	37.8 (32.0-44.0)	29.1† (25.8-32.3)
Binge Drinking	18.8† (15.6-22.4)	14.9† (10.3-20.9)	22.4 (18.2-27.3)	15.4**† (13.6-17.1)
Drinking on School Property	8.8 (7.0-10.9)	6.0 (4.4-8.2)	7.9† (5.6-11.0)	5.0 (4.2-5.9)
United States				
Indicator	Percentage (95% CI)			
	2005	2007	2009	2011
Ever Drank	74.3 (71.0-77.4)	75.0 (72.4-77.4)	72.5 (70.6-74.3)	70.8 (69.0-72.5)
Drink Before Age 13	25.6 (23.8-27.4)	23.8 (21.9-25.7)	21.1 (19.6-22.6)	20.5 (19.2-21.8)
Current Drinker	43.3 (40.5-46.1)	44.7 (42.4-47.0)	41.8 (40.2-43.4)	38.7 (37.2-40.3)
Binge Drinking	25.5 (23.3-27.9)	26.0 (24.0-28.0)	24.2 (22.6-25.9)	21.9 (21.0-22.8)
Drinking on School Property	4.3 (3.7-4.9)	4.1 (3.5-4.8)	4.5 (3.9-5.1)	5.1 (4.5-5.8)

* Statistically significant change from 2007 to 2009.

** Statistically significant change from 2009 to 2011.

† Statistically significant difference between United States and Hawai'i in sample year.

United States in 2005, 2007, and 2011 for lifetime alcohol use, current alcohol use, and binge drinking. However, the prevalence of having drunk before the age of 13 among adolescents in Hawai'i was significantly higher compared to the United States in 2009 (28.6% and 21.1%, respectively). In addition, the prevalence of drinking on school property was significantly higher in Hawai'i compared to the United States in 2005 and 2009 (8.8% and 7.9%, versus 4.3% and 4.5%, respectively). The prevalence of lifetime alcohol use and drinking before the age of 13 among Hawai'i's adolescents increased in 2009 compared to 2007 but then decreased in 2011. The prevalence of binge drinking among youth also decreased from 2009 to 2011 in the state of Hawai'i (22.4% and 15.4%, respectively). These trends were not observed on the national level. The prevalence of alcohol use among United States adolescents remained fairly constant between 2005 and 2011 across all five alcohol use indicators.

Lifetime use (Figures 1A and 1B)

The overall decreasing trend of lifetime alcohol use appeared to reverse in 2009 among both males and females and students in the 9th and 11th grades. However, in 2011, the apparent increase in lifetime alcohol use was no longer observed among Hawai'i's adolescents. The lifetime prevalence of alcohol use

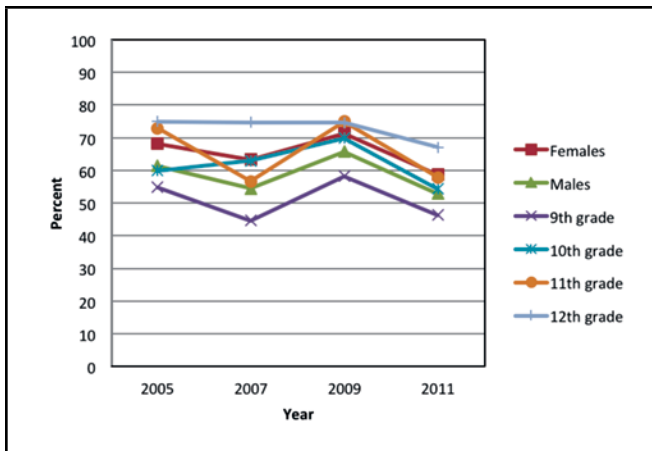


Figure 1 A. Lifetime Alcohol Use: Percentage of students reporting having at least one drink of alcohol in their life by gender and grade level.

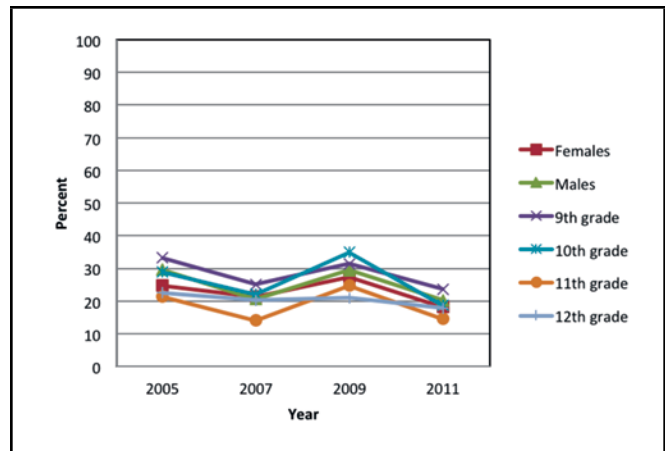


Figure 2 A. Onset Age: Percentage of students reporting ever drinking alcohol before age 13 by gender and grade level.

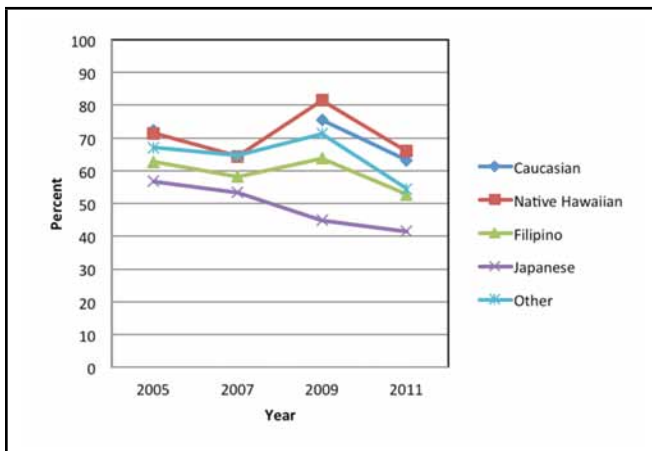


Figure 1 B. Lifetime Alcohol Use: Percentage of students reporting having at least one drink of alcohol in their life by ethnicity.

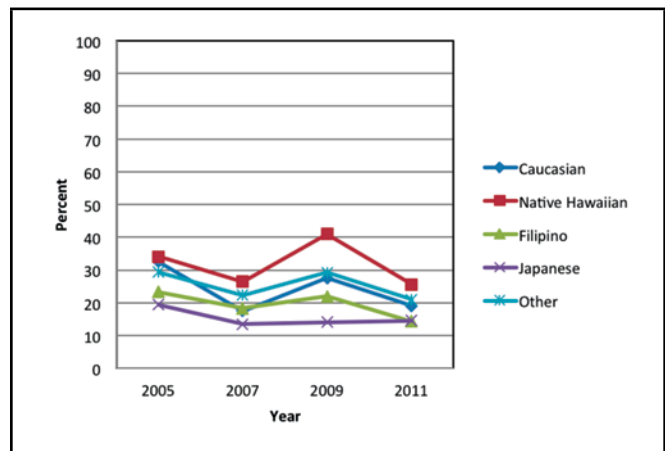


Figure 2 B. Onset Age: Percentage of students reporting ever drinking alcohol before age 13 by ethnicity.

*Note on tables: Missing data points indicate un-reportable prevalence measure.

was significantly lower in 2011 compared to 2009 among both males (65.9% and 53.0%, respectively) and females (71.5% and 58.7%, respectively) and students in the 10th and 11th grades. Among students in the 12th grade, the lifetime prevalence of alcohol use remained fairly constant from 2005 to 2011.

The lifetime prevalence of alcohol use among adolescents in Hawai'i showed a similar trend from 2005 to 2011 among the different ethnicity groups except for Japanese. The prevalence of alcohol use was significantly higher in 2009 compared to 2007 for students reporting Native Hawaiian ethnicity (64.4% and 81.6%, respectively). However, the prevalence of lifetime alcohol use decreased from 2009 to 2011 for Native Hawaiian, Caucasian, and "Other" youth. Among students reporting Japanese ethnicity, the prevalence of lifetime alcohol appeared to follow a decreasing trend from 2005 to 2011.

Onset age (Figures 2A and 2B)

The proportion of students who reported their first drink of

alcohol before age 13 appeared to increase from 2007 to 2009 after an apparent decrease from 2005 to 2007 among both males and females and among all grade levels except the 12th grade. However, in 2011, this apparent increase was no longer observed. In 2011, the proportion of students reporting their first drink of alcohol before age 13 was significantly lower compared to 2009 among males (20.3% and 29.4%, respectively) and females (18.2% and 27.6%, respectively) and among students in the 10th and 11th grades. Among students in the 12th grade, the proportion of students reporting having their first drink of alcohol before age 13 remained fairly constant.

A similar trend was observed in the proportion of students who reported their first drink of alcohol before age 13 among all ethnicities except for Japanese. The proportion of students who reported drinking before the age of 13 was higher in 2009 compared to 2011 among students reporting Native Hawaiian and "Other" ethnicities. Among Japanese youth, the proportion of students who reported their first drink of alcohol before the

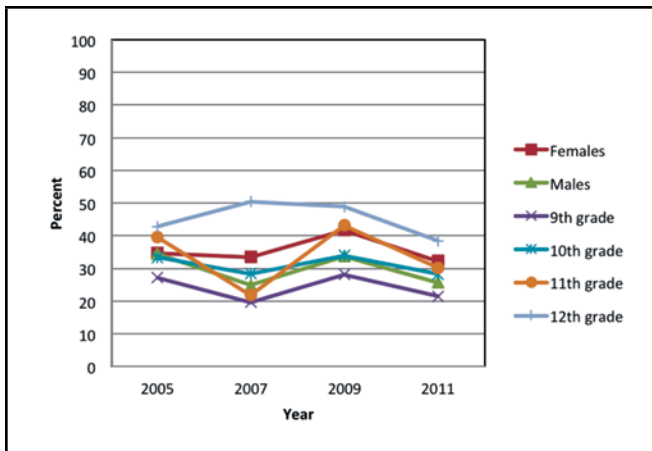


Figure 3 A. Current Alcohol Use: Percentage of students reporting having at least one drink of alcohol in the 30 days before the survey by gender and grade level.

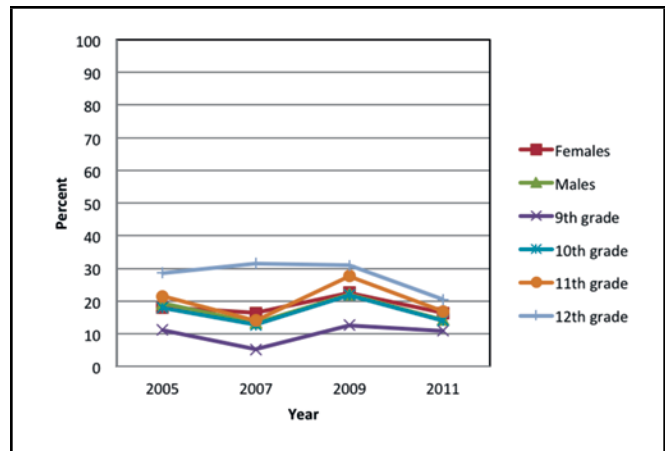


Figure 4 A. Binge Drinking: Percentage of students reporting having five or more alcoholic drinks in a row on at least one day in the 30 days before the survey by gender and grade level.

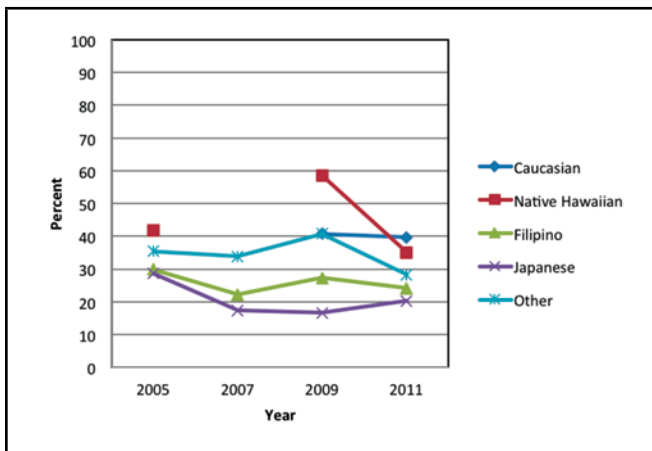


Figure 3 B. Current Alcohol Use: Percentage of students reporting having at least one drink of alcohol in the 30 days before the survey by ethnicity.

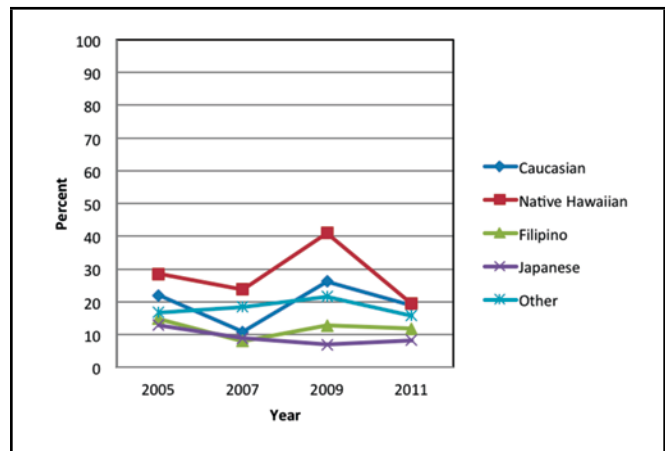


Figure 4 B. Binge Drinking: Percentage of students reporting having five or more alcoholic drinks in a row on at least one day in the 30 days before the survey by ethnicity.

No trend line is drawn for Caucasian and Native Hawaiian ethnicities due to unreportable data in 2007. Data point for Caucasian in 2005 is underneath Native Hawaiian data point.

age of 13 remained fairly constant in 2007, 2009, and 2011 (13.5%, 14.1%, and 14.6%, respectively). Students reporting Native Hawaiian ethnicity had the highest proportion of reported drinkers before the age of 13 from 2005 to 2011 among all ethnicities (34.1%, 26.5%, 41.1%, and 25.6%, respectively).

Current use (Figures 3A and 3B)

The prevalence of current alcohol use appeared to increase from 2007 to 2009 after an apparent decrease from 2005 to 2007 among both males and females and students in the 9th, 10th, and 11th grades. However, in 2011, this increase appeared to be reversed among Hawai'i's youth. Among 11th graders, there was a significant decrease in the prevalence of current alcohol use from 2005 to 2007 (39.5% and 21.8%, respectively) followed by a significant increase in the prevalence of current alcohol use from 2007 to 2009 (21.8% and 43.3%, respectively). Students

in the 12th grade reported fairly constant current alcohol use in 2007 and 2009 (50.5% and 48.9%, respectively).

The prevalence of current alcohol use was significantly lower in 2011 compared to 2009 among students reporting Native Hawaiian and "Other" ethnicities. In contrast, students reporting Caucasian ethnicity had a fairly constant prevalence of current alcohol use in 2005, 2009, and 2011 (41.7%, 40.8%, and 39.6%, respectively) with no data reported in 2007. Students reporting Japanese ethnicity had an apparent decrease in the prevalence of current alcohol use from 2005 to 2007 (28.6% and 17.3%, respectively) and a fairly constant prevalence of current alcohol use in from 2007 to 2011.

Binge drinking (Figures 4A and 4B)

Among Hawai'i's adolescents, the prevalence of binge drinking followed a similar trend among both males and females and

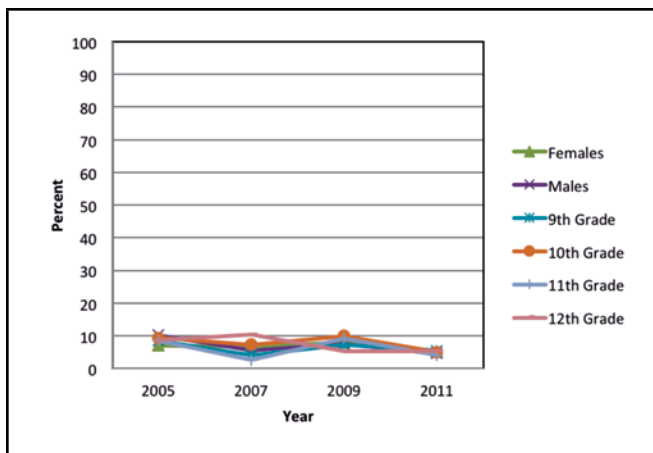


Figure 5 A. Drinking on School Property: Percentage of students reporting having at least one drink of alcohol on school property in the 30 days before the survey by gender and grade level.

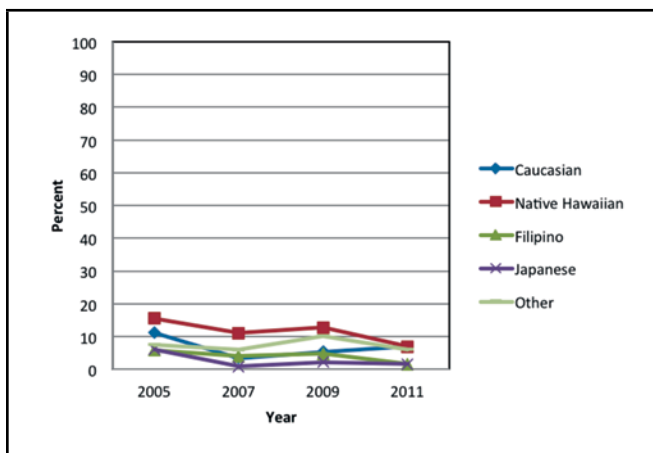


Figure 5 B. Drinking on School Property: Percentage of students reporting having at least one drink of alcohol on school property in the 30 days before the survey by ethnicity.

students in the 9th through 11th grade. The overall decreasing trend appeared to reverse in 2009 among all students except those in the 12th grade. However, this apparent increase was only observed in 2009. The prevalence of binge drinking significantly decreased in 2011 compared to 2009 among males (22.2% and 14.3%, respectively). Students in the 12th grade reported a fairly constant prevalence of binge drinking in 2005, 2007, and 2009 with an apparent decrease in binge drinking prevalence in 2011 (28.6%, 31.6%, 30.9%, and 20.5%, respectively).

A similar trend in the prevalence of binge drinking was reported among Native Hawaiian, Caucasian, and Filipino youth. An apparent increase in binge drinking prevalence was observed among all ethnicities except Japanese in 2009. In 2011, this apparent increase was no longer observed. Among students reporting Native Hawaiian ethnicity, the prevalence

of binge drinking was significantly lower in 2011 compared to 2009 (19.5% and 41.1%, respectively). A fairly constant prevalence of binge drinking in 2007, 2009, and 2011 was seen for students reporting Japanese ethnicity (8.9%, 6.9%, and 8.2%, respectively). An overall increasing trend was observed among students reporting “Other” ethnicity from 2005 to 2009.

Drinking on school property (Figures 5A and 5B)

A similar trend in the prevalence of drinking on school property was observed among Hawai‘i’s adolescents except those in the 12th grade. An apparent increase in the prevalence of drinking on school property from 2007 to 2009 was observed among both males and females and students in the 9th through 11th grades. However, this apparent increase was not observed in 2011. Among students in the 11th grade, the prevalence of drinking on school property increased significantly from 2007 to 2009 (2.6% and 9.3%, respectively). However, in 2011, the prevalence of drinking on school property decreased significantly among students in the 11th grade. Among students in the 12th grade, an opposite trend was observed with an apparent decrease in the prevalence of drinking on school property in 2009 compared to 2007 (5.2% and 10.5%, respectively).

A similar trend in the prevalence of drinking on school property was observed among all ethnicities except Caucasian. The prevalence of drinking on school property appeared to increase in 2009 compared to 2007 among all ethnicities. In 2011, the prevalence of drinking on school property appeared to decrease among Native Hawaiian, Filipino, Japanese, and “Other” ethnicities. In contrast, the prevalence of drinking on school property appeared to have an increasing trend in 2007, 2009, and 2011 among Caucasian youth (3.4%, 5.3%, and 6.9%, respectively). Students reporting Native Hawaiian ethnicity had the highest prevalence of drinking on school property (15.5%, 11.1%, 12.8%, and 6.8%, respectively).

Discussion

Hawai‘i State and National Drinking Prevalence

Overall, adolescents in Hawai‘i tend to report better alcohol use behaviors compared to the US youth except for drinking before the age of 13 and drinking on school property. A possible reason for this may be the open architecture of Hawai‘i schools, the shared use of public school and public park facilities, and the common access to school grounds for recreational purposes outside of regular school hours in Hawai‘i. This may blur the lines between school and public property which may not be the case on the mainland where access to facilities may be more closely regulated. Compared to US youth, adolescents in Hawai‘i fared worse for drinking before the age of 13 in 2009 and for drinking on school property in 2005 and 2009. However, in 2005, 2007, and 2011, Hawai‘i’s youth were less likely to report ever drinking, current drinking, and binge drinking. There are many possible contributing factors to the observed changes between Hawai‘i and the United States including ethnic and cultural differences and local environment. Differences in adolescent alcohol consumption behaviors have been

observed in ethnic and culturally diverse areas.²⁰ Asian youth tend to report fewer alcohol consumption behaviors compared to Pacific Islander and White youth. The complex and diverse ethnic and cultural makeup of Hawai'i's youth may contribute to the observed dissimilarities in alcohol use between Hawai'i and the United States. However, the exact reasons for the differences in specific alcohol use indicators between Hawai'i and the United States is unknown.

In 2009, students in Hawai'i were more likely to report ever drinking and drinking before the age of 13 compared to 2007. However, in 2011, Hawai'i's youth were less likely to report ever drinking, drinking before the age of 13, and binge drinking compared to 2009. These trends were not observed on the national level. In the United States, the prevalence of alcohol use remained fairly constant between 2005 and 2011. The reasons why adolescents in Hawai'i reported worse underage drinking behaviors in 2009 compared to 2007 are not clear. There are numerous possible reasons for this change, although none have been investigated. In 2007, the United States experienced an economic downturn which may have affected drinking patterns.²¹ It has been shown that alcohol consumption is positively associated with various life stresses, including job loss or economic struggles.²² However, the whole nation endured economic downturn in 2007, but the upward trend in adolescent drinking prevalence was only seen for Hawai'i and not at the national level. Economic downturn may also affect funding for prevention programs. Decreased funding for prevention programs may result in higher drinking risk behaviors among adolescents. One source of funding for underage drinking prevention in Hawai'i in 2007 was the Strategic Prevention Framework-State Incentive Grant. However, many programs were in the beginning stages of implementation and their impact on underage drinking may not be seen right away. The recent improvement in the economy, and the progression of prevention programs, may have influenced the better underage drinking behaviors observed in 2011. The YRBS survey is revised before each data collection period to represent the current interests and needs of the nation and of each participating region. Revision, addition or deletion of survey questions may influence the ability to track trends in risk behaviors over time. However, the reported alcohol use indicator survey questions have been consistently asked in each survey period from 2005 to 2011. In addition, sampling and data collection methods for the YRBS are consistent over the survey periods. Thus any changes in the YRBS questionnaire should not affect the reported adolescent alcohol use trends.¹⁷

Trends in Prevalence of Drinking

Similar trends in drinking behaviors were observed among both males and females and among students in the 9th through 11th grades. A decreasing trend in alcohol use behaviors among Hawai'i's adolescents from 1997 to 2007 has been previously reported.¹⁵ This decreasing trend appeared to be reversed in 2009 in most alcohol use indicators among males and females and students in the 9th through 11th grades. However, this apparent

increase in alcohol use was only observed for one assessment period and was not observed in 2011. Students tended to report better alcohol use behaviors in 2011 compared to 2009. Previously mentioned factors such as changes in the economy and underage drinking prevention programs may have influenced these trends in adolescent alcohol use in Hawai'i.

Students in the 12th grade generally reported more consistent levels of alcohol use between 2005 and 2011 compared to students in the 9th through 11th grades. These results suggest that older adolescents (12th grade) may react differently compared to younger adolescents (9th - 11th grade) with respect to alcohol use trends over time. In regards to ethnicity, similar trends in drinking behaviors were generally observed for all ethnicities except for Japanese. Alcohol use behaviors among students reporting Japanese ethnicity generally improved between 2005 and 2011. Japanese students may have different alcohol use trends due to cultural and biological differences. A biological mechanism found in some persons of Asian ancestry causes flushing of the face with alcohol consumption. This trait may cause Asians to drink less than persons of other ethnicities.^{23,24} Additionally, ethnic differences have been observed in family factors, including parental involvement and family structure, associated with alcohol use behaviors among Asian American youth.²⁵

Strengths and Limitations

The YRBS is a large national, state, and metropolitan school district level survey which allows for tracking of the prevalence of youth risk behaviors over time. The data is useful to examine alcohol use among Hawai'i's adolescents. This data allows for comparisons both within the State of Hawai'i between ethnicities, grade levels, and genders, and also between state and national level data. Significant changes in prevalence measures can be examined through 95% confidence intervals provided by the CDC. However, sample sizes vary from year to year in YRBS data collection. Relatively smaller sample sizes in 2005, 2007 and 2009 compared to 2011 may have influenced the ability to detect significant differences within the apparent trends in adolescent drinking behaviors. In addition, the data from the YRBS relies on self-reporting of alcohol risk behaviors leading to possible over or under reporting. The data for Hawai'i is collected only among public school students and is not generalizable to all adolescents in the state or in the United States. Students attending private school, who are home-schooled or who do not attend school, and who may have different alcohol risk behaviors than those attending public school are not included in data collection. Furthermore, small sample size among certain groups may lead to missing data values as the YRBS does not report subgroup findings if the sample size is less than 100 students.¹⁶

Recommendations

The data from the Hawai'i State YRBS revealed that adolescent alcohol use varies over time. Thus, it is important to continue to monitor and track adolescent alcohol use behaviors. In

addition, adolescent alcohol use trends in Hawai'i were not comparable to US trends. It is especially important to continue to track alcohol use among youth in Hawai'i. Further research is suggested to investigate the possible causes of the trends in adolescent alcohol behaviors. It is recommended that there be an ongoing effort to examine recent trends in adolescent alcohol use in Hawai'i. This information is valuable in the planning and evaluation of alcohol prevention programs and for informing policy. Specifically, it is warranted to provide increased resources to adolescent alcohol prevention efforts in order to encourage better alcohol behaviors among Hawai'i's adolescents.

Conflict of Interest

None of the authors report a conflict of interest.

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MEDICAL SCHOOL HOTLINE

Addressing Healthcare Accountability at John A. Burns School of Medicine

Kathleen Kihmm Connolly MS

The Medical School Hotline is a monthly column from the John A. Burns School of Medicine and is edited by Satoru Izutsu PhD; HJMPH Contributing Editor. Dr. Izutsu is the vice-dean of the University of Hawai'i John A. Burns School of Medicine and has been the Medical School Hotline editor since 1993.

In the past century, medical educators have focused on the delivery of skilled practitioners that are trained to provide the highest quality of care possible.¹ However a challenge for medical schools is not only to train skilled and competent practitioners, but to be socially responsible for the priorities and healthcare concerns of the communities in which they serve. This concept, known as “social accountability”, applies to both the medical school as an institution and the graduates that the school produces.¹

World Health Organization defines social accountability for medical schools as:

“...the obligation to direct their education, research and service activities towards addressing the priority health concerns of the community, region, and/or nation they have a mandate to serve.”²

Social accountability is not only a responsibility to the community, but also the act of being accountable. In the current healthcare system there are several growing healthcare concerns: (1) physician and healthcare professional shortage; (2) health professionals migrating to financially and socially attractive positions; (3) medically underserved populations; and (4) deficits in disease prevention and health promotion.³ To be accountable, medical schools need to fulfill their inherent obligation to alleviate these stresses in the healthcare system. This can be done by training a competent and socio-culturally aware health and biological science workforce, providing healthcare outreach and services to those in need, and conducting research to benefit health and well-being of the community.²

To demonstrate accountability, the University of Hawai'i at Mānoa John A. Burns School of Medicine (JABSOM) compiled a report to the legislature exemplifying outreach programs, service projects, and research in which JABSOM faculty, staff and students have participated. The contents of this report are activities conducted during the 2011-2012 academic year at JABSOM. The report is categorized by senatorial district to show the impact of JABSOM on specific communities in Hawai'i. The aim of the report is to show accountability and how JABSOM contributes directly to the community. The following are some of the activities highlighted in the report.

Education

The school's basic mission is not only to train high-quality physicians, but also to train biomedical scientists and allied health workers. Of the 469 registered students, 77% of whom are residents of Hawai'i (fall 2012 enrollment), approximately 47% (220 students) are seeking (non-M.D.) degrees in other programs that include the following.

- Master of Public Health (MPH)
- Doctor of Public Health (DrPH)
- Doctor of Philosophy (PhD) in Epidemiology
- Master of Science (MS) or Doctor of Philosophy (PhD) in
 - Biomedical Sciences
 - Cell & Molecular Biology
 - Developmental & Reproductive Biology
- Master's Degree (MS) in Communication Sciences Disorders
- Bachelor of Science (BS) degree in Medical Technology

To address the needs of underserved populations, JABSOM's 30 year old 'Imi Ho'ōla (“Those Who Seek to Heal”) Post-Baccalaureate Program provides educational opportunities for disadvantaged students who are selected on the basis of their commitment to serve in underserved areas in Hawai'i and the Pacific. Many of these students are from these underserved communities. Of the 226 graduates (40% being Native Hawaiian) 85% are practicing physicians in primary care, and 96% are currently working with underserved and/or disadvantaged populations.⁴

JABSOM's efforts to train a physician workforce addresses the growing healthcare workforce shortage in primary care medicine. Associate Professor Kelley Withy, MD has obtained funding from the State Loan Repayment Program, a grant funded under the Patient Protection and Affordable Care Act of 2010. The program extends a helping hand to assist physicians (allopathic/osteopathic), nurse practitioners, certified nurse-midwives, and physician's assistants who commit to serve for at least two years in public or non-profit private entities located in health professional shortage areas. The goal of this program is to improve the retention and number of primary care providers in medically underserved areas in Hawai'i.⁵

A key step in the accountability for graduating medical students is to prepare graduates to work effectively with disparate populations and gain practical experience in community-centered models of healthcare delivery.⁶ One example is the training program of the Department of Family Medicine and Community Health. Its main ambulatory training site, the Physician Center at Mililani, is located in rural O'ahu. It is the home-base for training JABSOM's Family Medicine students and residents. Students include medical residents, third and fourth year JABSOM students, UH Hilo College of Pharmacy students, and externs from various medical assistant training programs. The program is under the supervision of JABSOM faculty physicians and provides care to a diverse population. An objective of the program is to teach students to view patients in the context of their social, familial, and cultural backgrounds in making medical decisions. Education and hands-on experiences are provided on cross-cultural patient care, homelessness, and prison medicine.

Outreach

Underserved communities face many obstacles in the healthcare system that include problems with access to care and poor health outcomes.⁷ Medical outreach activities provide services to communities that might not otherwise have access to those services. JABSOM's chief outreach program is the Hawai'i Homeless Outreach and Medical Education (H.O.M.E.) project. This project was established in 2005 and continues to provide medical service to the homeless at three homeless shelters on O'ahu.⁸ In addition, the program conducts outreach services via a mobile van at O'ahu beaches and parks. Medical services include care for acute and chronic illnesses, preventative health series, vaccinations, medical testing, and health education. The project has been integrated into the medical school curriculum as a year-long rotation for first year medical students. The students experience working in community organizations with homeless patients and have the option to serve as mentors for homeless teens, thus gaining knowledge and awareness in caring for the underserved.

As part of the excellence in training healthcare professionals, JABSOM's student groups provide voluntary outreach in the community. This includes students from the 'Imi Ho'ola Post-Baccalaureate Program and JABSOM's Ka Lama Kukui (students who are interested in indigenous health). These student groups participate in outreach activities that include serving as mentors to disadvantaged high school students and conduct health screenings at community centers and health fairs. Hui Ola Pono, a Public Health Sciences student group, volunteers at Ho'oulu 'Aina, a place where community engages in the reforestation of Native Hawaiian species, restoration of ancient agricultural terraces, and development of a sustainable community food production system. Medical students also participate in the Healthy Keiki Can program that promotes the healthy development of Hawai'i's youth by providing mentoring relationships that offer guidance, companionship, and support.

Also in partnership with Big Brothers Big Sisters of Honolulu, medical students serve as mentors to elementary students who may be facing challenges in their lives.

Following are a few of the programs in which JABSOM Faculty, staff, and resident trainees participate.

- The Department of Psychiatry provides behavioral health geriatric care to nursing homes in Liliha, Kaimuki, and Nu'uuanu.
- The Department of Family Medicine and Community Health assists community leaders to promote aquaponics to families through education and workshops. A pamphlet on aquaponics was developed, which evolved into a newsletter called Ma Ka Hana Ka 'Ike.
- Hui No Ke Ola Pono, the Department of Native Hawaiian Health Community Engagement Division conducted the Land, Food, and Health initiative program. This program combines diabetes self-management classes and activities that reconnect patients with Pacific concepts of land and health.
- JABSOM faculty and staff participant in Tar Wars, a tobacco-free education program for children; volunteers visit 4th-grade class-rooms in Hawai'i to teach students how to avoid tobacco use through counseling and advising.

Service

A key component of social responsibility is service to promote better health for the community. The following are a few of the service projects and programs conducted by JABSOM in the 2011-2012 academic year.

- The Le'ahi Clint Spencer Immunology Clinic, part of the Hawai'i Center for AIDS, is the only specialized HIV/AIDS clinic in Hawai'i, providing state of the art care to all HIV positive patients, regardless of their ability to pay. Approximately 5% to 10% of patients have no medical insurance, and are unable to pay for services. Regardless of their ability to pay, the clinic serves all HIV positive patients and does not turn away those in need.
- Volunteers from the Department of Surgery provided free plastic and reconstructive surgery to wounded and deformed American soldiers returning from the wars in Iraq and Afghanistan. Services are provided through the Iraq Star Foundation.
- The Department of Communication Sciences and Disorder's training clinic, in 2011-2012, provided free services to patients with speech, language, and hearing issues.
- The Perinatal Addictions Treatment Clinic, established by the legislature of the state of Hawai'i, provides obstetric clinical services, addiction medicine services, social services, and counseling for pregnant women and new mothers who are struggling with substance abuse addictions. This year the clinic began offering education in early childhood development, which includes the particular harms that addictive substances can cause to children.
- Many JABSOM faculty members provide presentations and lectures to educate the community on healthcare issues, this includes topics of diabetic eye disease, diabetes management, nutritional promotion, and elderly care.

Research

It has been well documented that Native Hawaiian and Pacific Islanders have poor lifestyle behaviors and high prevalence of chronic conditions, compared to the overall population in the United States. This includes issues of obesity, smoking, and chronic conditions such as diabetes.⁹ It is apparent, the current state of healthcare in the United States is not fulfilling the needs of minority and underserved populations.⁷ Research, a critical component of a medical school's responsibility, must be conducted to find new more competent ways to treat patients, develop effective health interventions, as well as discover new knowledge in biological sciences.

JABSOM is the frontrunner in research on the health of Native Hawaiians, Pacific Islanders, and Asian Americans.

- The Pili 'Ohana program, Department of Native Hawaiian Health, has been conducting community-based research to address obesity and related health disparities in Hawai'i for over eight years. The aim of this program is to integrate community wisdom and scientific methods to combat obesity and reduce health disparities with Native Hawaiians and Pacific Peoples. Results of their program show a higher likeliness to maintain weight loss, compared to standard behavioral weight loss program.¹⁰
- The Fun 5 is a study that explored the implementation of a fruit and vegetable consumption and physical activity program. This study found that an afterschool program that emphasizes exercise and nutrition does have positive impacts on fruit and vegetable consumption and physical activity among elementary school children in Hawai'i.¹¹

Additional studies conducted by JABSOM faculty include the following.

- Research on the effectiveness of palliative care approaches for underserved populations.¹²
- Understanding the needs of diabetes management in Native Hawaiian, Pacific Islanders, and Asian Americans.¹³
- Understanding ethnic disparities in smoking and smoking cessation.¹⁴
- Exploration of telepsychiatry for rural patients in Hawai'i.¹⁵

Conclusion

This goal of this report is to exemplify JABSOM activities that demonstrate social accountability. It is well apparent that Hawai'i has many healthcare challenges. Native Hawaiians, Asian Americans, and Pacific Islanders are disproportionately affected by chronic diseases such as diabetes, heart disease, and hypertension. Native Hawaiians have the highest percentage rate of obesity (42.8%) compared to any other racial/ethnic group in the United States.¹⁶ Native Hawaiians/Pacific Islanders are also disproportionately affected by infectious diseases, such as

HIV/AIDS, at a rate of over two and half times that of White Americans.¹⁷ With the growing healthcare crisis and gap in health disparities, the contribution of a socially accountable medical school is critical in helping to close the gap. As such, social accountability cannot be accomplished alone. To be effective, collaborations with government and private sectors are a necessity. This is especially true since policy often dictates resources and economic allocation, ie, federal designations, appropriations, and grants.¹⁸ The Hawai'i State Legislature and public and private institutions have supported and made possible many of the successful programs at JABSOM. Moving forward, there are many healthcare challenges ahead. JABSOM will continue efforts towards social accountability and its responsibility to the people of Hawai'i.

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The Childhood Obesity Prevention Task Force (ACT 269): Recommendations for Obesity Prevention in Hawai'i

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Abstract

Obesity in both adults and children is a critical issue in Hawai'i, as well as nationally and internationally. Today in Hawai'i, 57 percent of adults are overweight or obese as are almost 1 in 3 children entering kindergarten. Each year, obesity costs Hawai'i more than \$470 million in medical expenditures alone.¹ These staggering human and economic costs underscore the serious need for Hawai'i to address obesity now.

Due to the urgent need to reverse the current trends in obesity Senate Bill 2778 was signed into law, on July 6, 2012, as Act 269 by Governor Neil Abercrombie, creating The Childhood Obesity Prevention Task Force. The task force was charged with developing policy recommendations and proposed legislation for the 2013 legislature. The task force ultimately identified eleven recommendations for the 2013 legislative session and one recommendation for the 2014 legislative session. When implemented together, these recommendations could profoundly reshape Hawai'i's school, work, community, and health care environments, making healthier lifestyles obtainable for all Hawai'i residents.

The Problem of Obesity in Hawai'i

While Hawai'i is considered one of the healthier states, like the rest of the nation, obesity trends have yet to decrease. In Hawai'i, 21.9% or 230,190 adults and 13.4% of youth are obese;^{2,3} additionally, there are major health disparities across racial and ethnic groups.^{2,3} Unless the trends in obesity change, this generation of young people may be the first to live shorter lives than their parents.⁴

The rise in obesity has grave health and economic implications for Hawai'i. Emerging economic studies show that unhealthy weight gain increases the risk for chronic and disabling health conditions, can reduce worker productivity, and require more medical interventions.⁵⁻⁷ Obesity increases the risk for chronic disease and disability and this epidemic is a setback to the advances made in healthcare to extend years of productive life. Poor nutrition, sedentary lifestyles, and obesity contribute to heart disease, stroke, diabetes, and some cancers. Obesity can also lead to disabilities such as osteoarthritis, infertility, asthma, sleep apnea, and premature death.⁸ The Centers for Disease Control and Prevention (CDC) estimates that obesity related medical expenditures cost an additional \$1,429 per person a year.⁹ In Hawai'i, this amounts to over \$470 million in annual obesity related medical costs. In the United States, the annual cost is over \$147 billion.¹

Youth Obesity, Nutrition and Physical Activity Data

Youth data has yet to show steady improvements for risk or protective factors against obesity. Rates of youth obesity in Hawai'i have remained below national targets, although wide disparities remain, with significantly higher rates of obesity among boys and certain ethnic groups (Filipino, Native Hawaiian, and Other Pacific Islander).³ Figure 1 depicts the prevalence of overweight and obesity among public high school students in Hawai'i.

A net increase in obesogenic behaviors have been observed with a corresponding decrease in obesity preventing behaviors. For example, only 21 percent of youth meet national recommendations for aerobic physical activity,¹⁰ and a full 61 percent of youth fail to meet American Academy of Pediatrics recommendations to limit screen time to no more than 2 hours per day.¹¹ In fact, there has been a 34 percent increase in the percentage of youth spending 3 or more hours per day playing video or computer games or using the computer (other than for homework) in a two year time period, between 2009 and 2011.¹² The 2008 *National Physical Activity Guidelines For Americans* can be referred to in Figure 2.¹³

Evidence supports that children are eating less healthy foods than they were in the past. For example, the proportion of the State's high school youth consuming sugary soda each day (18%) is two times the percentage of those consuming milk 3 or more times per day (9%). Furthermore, only about 18 percent of our youth eat 5 or more fruits and vegetables daily.^{14,15}

Adult Obesity, Nutrition, and Physical Activity Data

In 2011, only 24 percent of adults met the current national recommendations (Figure 2) for aerobic physical activity and muscle strengthening.¹⁶ A full 21 percent of adults reported no physical activity in the previous month.¹⁷ In terms of fruit and vegetable consumption, only 13 percent of adults reported eating fruit three or more times a day, and 19 percent reported eating vegetables three or more times a day.¹⁷ The full list of *Dietary Guidelines for Americans* can be accessed at <http://health.gov/dietaryguidelines/2010.asp>.

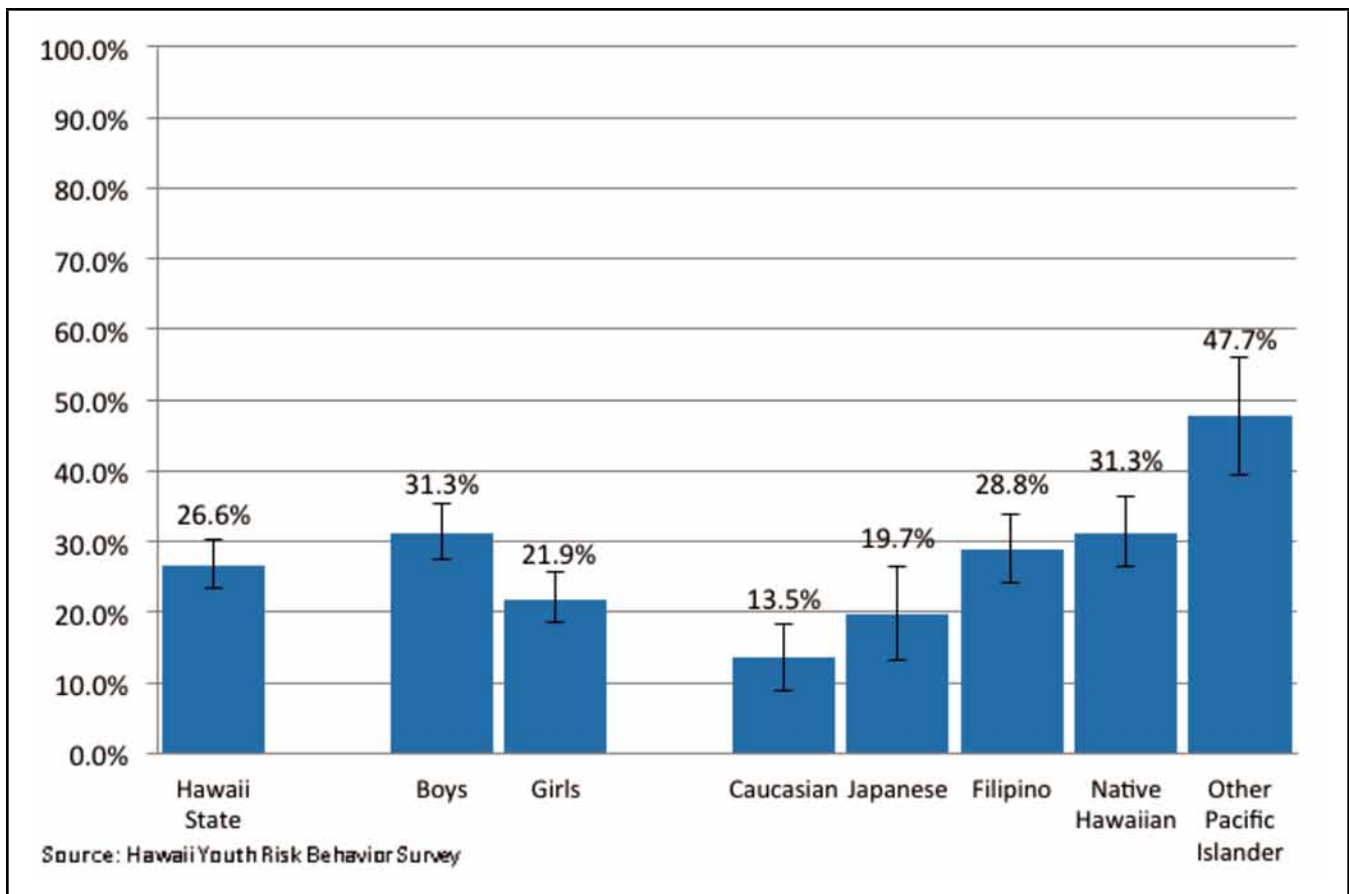


Figure 1. Obesity or Overweight Among Hawai'i High School Students, 2011

Children and Adolescents (aged 6-17) need at least:

- 60 or more minutes of aerobic physical activity each day (moderate or vigorous intensity activity). Be sure to include vigorous-intensity aerobic activity on at least 3 days per week.
- Muscle strengthening activities, such as gymnastics or push-ups, should be included at least 3 days per week as part of a child's 60 or more minutes.
- Bone strengthening activities, such as jumping rope or running, should be included at least 3 days per week as part of a child's 60 or more minutes.

Adults (aged 18-64) need at least:

- 150 minutes per week (2.5 hours) of moderate-intensity aerobic activity (ie, brisk walking), or 75 minutes (1 hour and 15 minutes) per week of vigorous-intensity aerobic physical activity. Aerobic activity should be performed in increments of at least 10 minutes and preferably spread throughout the week.
- Muscle strengthening activities should also be performed on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).

The 2008 Physical Activity Guidelines for Americans can be accessed at: <http://www.health.gov/paguidelines/>

Figure 2. 2008 Physical Activity Guidelines for Americans

Hawai'i's adult overweight and obesity rates are among the lowest in the nation, but they are rising. From 2000 to 2010, the percentage of adults considered obese increased 48 percent. Additionally, there are major health disparities across racial and ethnic groups. For instance, 44 percent of Native Hawaiians adults are obese compared to 14 percent of Japanese adults. Individuals with lower income, less education and on the neighbor

islands are also more likely to be obese.² Figure 3 depicts the prevalence of overweight and obesity among Hawai'i adults.

The Need for a Comprehensive Approach to Reduce Rates of Obesity in Hawai'i

Overweight and obesity result from a complex interaction of biological and environmental factors beginning with infant

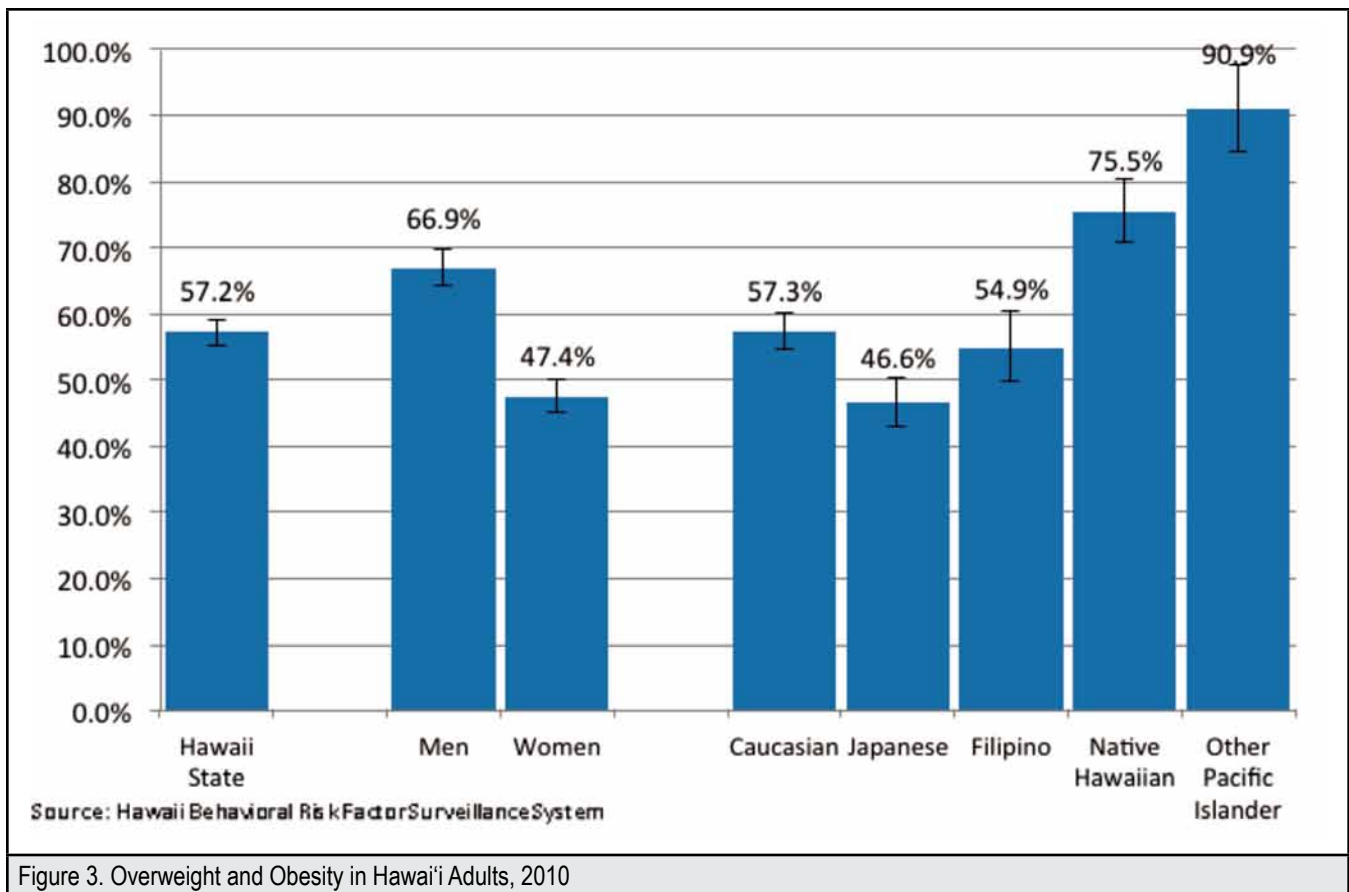


Figure 3. Overweight and Obesity in Hawai'i Adults, 2010

feeding and continuing with the environment, food system, marketing, and policies and systems that have unintentionally created sedentary activities and less healthy food options as the easy choices. Over the last few decades, we have engineered physical activity out of our everyday lives and have increased our calorie consumption.

National organizations, including the CDC and the Institute of Medicine (IOM), recommend utilizing a comprehensive framework of policies to address obesity. In May 2012, the IOM released a report delineating these recommendations. This report, called *Accelerating Progress in Obesity Prevention: Solving the Weight of the Nation*, stressed the importance of a comprehensive approach because of the inherent complexity of the obesity epidemic. The recommendations call for a sustained effort noting:

“If leaders across all levels of society are engaged and implement this comprehensive approach within the next decade, physical activity will become an integral and routine part of most people’s lives, and adults and children will have opportunities for enjoyable physical movement anywhere they spend time. Healthy foods will become the most visible, attractive, and easy-to-obtain options anywhere food is sold or served.”¹⁸

Government has used public health policy in many different arenas to improve health outcomes and protect the public’s health. Many of these government policy interventions have been

extremely successful. Previous public health policy interventions include: air bag and seat belt requirements for automobiles, cell phone laws, vaccination requirements, and—most notable—prohibition and restriction of tobacco products. Due to a comprehensive framework of tobacco policies, including tobacco sales tax, public smoking laws, restriction of sales to minors, public education campaigns, and restriction of advertising near schools, tobacco use has dropped tremendously. Smoking rates among high school students in Hawai‘i decreased 65 percent from 2000 to 2011.¹⁹ A similar comprehensive framework of policies to encourage physical activity and healthy eating is needed to change social norms and create environments where healthy choices are the easiest choices for Hawai‘i residents.

Overview of the Childhood Obesity Prevention Task Force

On July 6, 2012, Senate Bill 2778 was signed into law as Act 269 by Governor Neil Abercrombie, creating *The Childhood Obesity Prevention Task Force*, to address the growing crisis of childhood obesity in Hawai‘i. The task force was charged with:

- Assembling accurate research, fiscal and demographic information to support policy development, and tracking outcomes;
- Researching other state, county, and organizational policy

Childhood Obesity Prevention Task Force Recommendations		
Education	Bill	Reso
1. Develop and Implement Early Childcare Wellness Guidelines <ul style="list-style-type: none"> Development and implementation of wellness guidelines for the early childcare settings 	X	
2. Require a Standardized Fitness Assessment in Elementary, Middle, and High School <ul style="list-style-type: none"> Requires statewide fitness assessment in middle school and high school Encourages fitness assessments in fifth grade Will collect data points on the fitness levels of Hawai'i youth and report information back to parents, allows students to set personal fitness goals 	X	
3. Assess Barriers and Develop a Timeline towards Implementation of the National Physical Education Recommendations in Hawai'i Public Schools <ul style="list-style-type: none"> Study conducted with UH/Kinesiology and Recreational Science, DOE, and DOH to identify barriers and steps towards increasing PE requirements 		X
4. Ensure Early Detection of Health Issues in Order to Optimize Health and Wellness in Children and Adolescents <ul style="list-style-type: none"> Would increase physical exam requirement for grades 6 & 9, and gather BMI data. Parents would be provided with an active opt-out for middle and high school examination requirements. Currently, a physical exam is only required in kindergarten for entry into public school 	X	
Community Design and Access		
5. Assess a Fee on Sugar-Sweetened Beverages with All Revenue Going to the Prevention of Childhood Obesity and Early Childhood Health <ul style="list-style-type: none"> \$1.28 per gallon fee for distributors of sugary beverages Goal is to reduce consumption of sugary beverages through price differentiation at retail point-of-purchase Revenue from fees to go towards obesity prevention and health promotion programs However, Some fee revenue will be required to set up DOH program to administer the fee collection and enforcement program 	X	
6. Remove the General Excise Tax (GET) on Fresh Fruits and Vegetables <ul style="list-style-type: none"> Exempts fresh fruits and vegetables (as defined in the WIC food package) from GET Would be implemented along with an educational campaign to encourage consumption of fruit and vegetables 	X	
7. Include Health as a Priority in Land Use and Transportation Planning <ul style="list-style-type: none"> Require the convening of a task force with appropriate land-use, transportation and public health state agencies, and community and advocacy organizations. This group will develop legislative recommendations that include health as a priority in land-use planning and transportation decisions, including, but not limited to creating policies and funding for bike/pedestrian facilities on all appropriate streets, roads and highways statewide and adding health as a consideration in land-use planning policies and decisions. 		X
Healthcare	Bill	Reso
8. Increase Hawai'i's Rates of Exclusive Breastfeeding at Hospital Discharge <ul style="list-style-type: none"> Urges hospitals to develop written breastfeeding policy that supports exclusive breastfeeding and provides for continuous staff training Resolves that as a state we will work to increase the overall rates of exclusive breastfeeding at hospital discharge 		X
9. Ensure Sustainability and Development of Electronic Medical Records <ul style="list-style-type: none"> Resolution developed by the Hawai'i Health Information Exchange to ensure sustainability for building and maintaining the health information exchange as a vehicle for tracking progress in the assessment, prevention and treatment of obesity 		X
10. Identify and Develop Solutions for Gaps and Issues Related to Obesity Prevention Reimbursement <ul style="list-style-type: none"> Develops working group to assess gaps in reimbursement, physicians needs, and current ICD-9 codes, and upcoming ICD-10 codes Supports and educates physicians and the public on Affordable Care Act coverage for obesity prevention 		X
Worksite, Business, and Industry		
11. Develop and Implement Nutrition Standards for Government Agencies <ul style="list-style-type: none"> Establish and implement statewide nutrition standards for foods and beverages for purchase and served in vending machines, stores, cafeterias, or other operations in government facilities 		X
12. Provide Technical Assistance on Worksite Wellness for State and Private Businesses and Provide a Tax Incentive for Employers who offer Comprehensive Wellness Programs <ul style="list-style-type: none"> Identify and fund a state agency to provide technical assistance on worksite wellness for state and private businesses Provide tax incentives for private employers who offer comprehensive wellness programs 	X	
Total Proposed Draft Bills and Resolutions	6	6

Figure 4. Childhood Obesity Prevention Task Force Recommendations and Proposed Vehicle (Bill or Resolution)

agendas and suggesting best practices related to childhood obesity prevention policies; and

- Reporting its findings and recommendations, including proposed legislation, to the legislature no later than twenty days prior to the convening of the 2013 regular session.

The Childhood Obesity Prevention Task Force was comprised of twenty voting members, designated in the bill, representing the House, Senate, Governor, State agencies, University of Hawai'i, and several non-profit organizations representing health and early childhood education. Additional representatives of organizations were invited to take part in the discussions,

including health plans and other state departments. The meetings were open to the public, with time for public comment built into each meeting agenda. The task force met five times from August 2012 through December 2012.

The *Childhood Obesity Prevention Task Force* members reviewed national recommendations, peer-reviewed research, Hawai'i data, and other States' obesity-related research and policy recommendations. The task force discussed the alarming rise in obesity among all age groups, and agreed that our State has become characterized by environments that promote physical inactivity and overconsumption of unhealthy food. Obesity affects all Hawai'i residents, not only children. The task force concluded that addressing this complex, multifaceted problem urgently requires policy and environmental changes that reach the entire population. After reviewing and discussing the research, the members voted to expand their task to develop a comprehensive set of obesity prevention policies for Hawai'i residents of all ages.

Overview of the Task Force Comprehensive Policy Recommendations

The *Childhood Obesity Prevention Task Force* chose to focus their policy recommendations in four critical settings based on recommendations by the IOM: Education, Community Design and Access, Healthcare, and Worksite Industry and Business.²⁰ The task force members identified eleven priority recommendations for the 2013 legislative session and one recommendation for the 2014 legislative session as a comprehensive response to the complex issue of obesity. These recommendations, summarized in Figure 4, represent a multi-sectorial approach, of enduring quality, that together will create social changes. The summative goal of these recommendations is to mount a social change where healthy living becomes the norm.

The task force recommendations, when implemented together, have the potential to reshape the environments in Hawai'i where people live, work, play, and learn. Hawai'i schools will surround children with environments filled with opportunities for nutrition and physical activity. Healthy foods will become more visible, attractive, and easy to obtain in our communities, and unhealthy options will be less attractive and available. Our communities and streets will encourage and provide safe opportunities for physical activity and active transportation. Healthcare providers will be able to provide their patients with necessary knowledge and health management opportunities to improve their lifestyle behaviors. Employers will play an essential role in increasing physical activity and healthy food options for employees.

Next Steps

Establishing the *Childhood Obesity Prevention Task Force* has helped our state identify and move towards solutions for reducing obesity. Eight task force policy recommendations were

introduced during the 2013 legislative session. The task force recommendations will also be utilized in the development of the 2013-2020 Hawai'i State Physical Activity and Nutrition Plan which is currently being updated. Continued partnerships and collaboration among stakeholders and commitment from leaders will be necessary to educate and advocate for these important policy changes to create this urgent social change.

The full Childhood Obesity Prevention Task Force report can be accessed at: <http://co.doh.hawaii.gov/sites/LegRpt/2013/Reports/1/ACT%20269.pdf>.

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UNIVERSITY OF HAWAII CANCER CENTER CONNECTION

Shining Light on Cancer in the Pacific

Robert L. Haddock DVM, MPH

The Cancer Center Connection is a standing column from the University of Hawaii Cancer Center and is edited by Carl-Wilhelm Vogel MD, PhD; HJMPH Contributing Editor. Dr. Vogel is professor and former director of the University of Hawaii Cancer Center and has been the editor of this column since 2001.

The first cancer registry in the Pacific was established in Papua New Guinea in 1958.^{1,2} Seven years later a second cancer registry was established in Fiji.³ In the North Pacific, successive German, Japanese, and American bureaucracies administering the islands of Micronesia had encouraged the collection of vast amounts of health data but the analysis, dissemination and intelligent use of the data by administrators was sorely lacking.⁴ In 1977 the Secretariat for the Pacific Community (SPC – formerly the South Pacific Commission) developed a standard cancer reporting system in cooperation with the International Agency for Research on Cancer (IARC) using IARC-developed CanReg software. In 1989 and again in 1991 courses were held at the SPC headquarters in Noumea to train cancer registrars from French-speaking countries of the Pacific and in 1998 a course was held at the same venue for cancer registrars from 13 English-speaking Pacific countries and territories.⁵ Many of the trainees returned home to successfully establish cancer registries in their respective jurisdictions – unfortunately in some cases lack of funding and local support allowed nascent cancer registries to die soon after their birth.

Despite these early efforts, cancer registration remained a mixed picture. The origins of the Guam Cancer Registry, while perhaps not typical, are illustrative of the problems encountered in establishing cancer registries in the region. The position of Territorial Epidemiologist within the Government of Guam was established in 1972 and although the official job description for this position did not limit the scope of work to the control of communicable diseases, on Guam, as in many other Pacific island countries and territories, emphasis was initially directed at controlling outbreaks of infectious diseases such as measles, dengue fever, cholera, influenza, etc. Over the years, however, questions about the impact of chronic diseases on Guam from both the public and medical professionals became more frequent. Dissatisfied with a lack of information regarding the impact of cancer on Guam, in 1998 the late Dr. Eduardo Cruz, then a physician member of the 24th Guam Legislature, introduced legislation to establish the Guam Cancer Registry (GCR) as an unfunded mandate of the Department of Public Health and Social Services (DPH&SS). Passed by the legislature as Bill 24–198, this legislation became effective with the signature of Governor Carl T. C. Gutierrez on May 6, 1998. After public hearings were held to create regulations governing operation

of the GCR, they were submitted to the legislature for review and went into effect on June 15, 1999.

Although prospective collection of reports of new cases of cancer on Guam began in 1998, additional data on earlier cancer cases was gathered by reviewing death certificate records in the Office of Vital Statistics dating back to 1970, the year that the standardized national death certificate was adopted for use on Guam. The format for the new death certificate record included information on contributing causes of death and “other significant conditions,” thus providing a more complete record of the medical state of deceased persons than was available on earlier death certificates. For purposes of cancer incidence registration, cases were added to the registry if cancer was specified in any section of the death certificate. Data on cancer cases diagnosed before 1998 was also collected by reviewing files of the American Cancer Society, Guam Chapter.

The GCR was initially operated as a collateral duty of Guam’s Territorial Epidemiologist. As the result of efforts initiated by Dr. Carl-Wilhelm Vogel of the University of Hawaii Cancer Center, a partnership was created between the University of Hawaii Cancer Center and the University of Guam. This partnership received funding from the National Cancer Institute’s (NCI) Center to Reduce Cancer Health Disparities through the Minority Institution/Cancer Center Partnership program, starting in 2003, and currently in its 10th year of support. The partnership grant from the NCI included support for the operation of the Guam Cancer Registry, a joint venture of the University of Guam and the Guam DPH&SS. The GCR registry was able to hire a full-time data collection specialist for the first time. This greatly improved the ability of the GCR to collect more accurate and complete information regarding Guam cancer cases. In recognition of its progress, in 2006 the GCR was awarded full-member status in the North American Association of Central Cancer Registries (NAACCR). In February, 2007, a second data collection specialist was hired. In 2009, the GCR published its first comprehensive report “Guam Cancer Facts & Figures 2003 - 2007”, updated in 2011. A significant step towards achieving long-term sustainability of the GCR occurred in 2010 when the Guam Legislature passed Public Law 30-80 which increased the tobacco tax by \$2 per pack and provided for a dedicated funding stream to support the operation of the GCR.

In the early 2000s, Dr. Neal Palafox of the University of Hawaii obtained support from the NCI to conduct a needs assessment in the United States Associated Pacific Island Territories (USAPI: American Samoa, the Republic of the Marshall Islands, the Federated States of Micronesia, the Commonwealth of the Mariana Islands, Guam, and the Republic of Belau) to identify and prioritize local and regional cancer prevention and control needs, and to help establish cancer prevention and control programs in each jurisdiction.^{6,7}

One of the outcomes of this activity was the creation of the Cancer Council of the Pacific Islands (CCPI), as well as the recognition that if an accurate assessment of the state of cancer in the USAPI was to be achieved, individual cancer registries in each jurisdiction would need to be established, including financial support, guidance, and training. Only through such a collaborative effort could the collection of more uniform and comprehensive cancer incidence and mortality data be undertaken.^{8,9} Plans were developed by Dr. Palafox to establish a Pacific Regional Central Cancer Registry, housed at the GCR and serving all the USAPI. A five-year grant was received from the Centers for Disease Control and Prevention (CDC), recently renewed for another five-year period. Thus was born the Pacific Regional Central Cancer Registry (PRCCR). Initially focusing on training, policy development, legislation, and infrastructure challenges, cancer cases from the USAPI cancer registries from 2007 onward were collected at the regional PRCCR office located on the University of Guam campus.¹⁰

It is hoped that these landmark developments will usher in a new era when the collection of regional cancer data will not be an end in itself but an agent for evaluation of programs and the impetus for improvements in cancer control and care in the region.

For more information on the University of Hawai'i Cancer Center/University of Guam Partnership, the University of Guam Cancer Research Center, and the Guam Cancer Registry, including a link to the "Guam Cancer Facts & Figures 2003–2007," please visit: <http://www.guamcancerresearch.org>. Information on the Pacific Regional Central Cancer Registry and related Pacific cancer programs may be accessed at: <http://www.pacificcancer.org>, and information on the University of Hawai'i Cancer Center and the Hawai'i Tumor Registry may be accessed at: <http://www.uhcancercenter.org>.

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University of Hawai'i at Manoa



Haleakala Crater



PORTENOY'S COMPLAINT. PHARMAGEDDON IS UPON US, AND HE DID IT.

Twenty years ago, Russell Portenoy, a prominent New York psychiatrist, pushed a movement to help people with chronic pain. Physicians had been educated to be cautious in use of narcotics to avoid addicting patients. Long-term use was limited to cancer patients. Dr. Portenoy's message was that patients with chronic pain had little risk of addiction or overdose. He claimed that less than one percent (1%) of opioid users became addicted. His influence kicked the narcotic door wide open. Vicodin, OxyContin, and Percocet became almost as available as chewing gum. In 1998 the Federation of State Medical Boards (FSMB) released new policy reassuring doctors they would not face regulatory action for prescribing large amounts of narcotics for pain patients. Incredibly the FSMB called on state medical boards to make under-treatment of pain punishable! The Joint Commission on Hospital Accreditation (JCAHO) jumped on the narcotic bandwagon with a guide stating, in treating pain "there is no evidence that addiction is a significant issue." A scale from one to ten was introduced and patients were asked to rate their pain. People lost sight of the fact that these drugs are dangerous and highly addictive. Now Dr. Portenoy admits his error. His one percent (1%) figure was based on a single paragraph in a 1980 New England Journal of Medicine report describing hospitalized patients briefly given opioids. It was never intended as a benchmark for narcotic prescription. In the past decade opioid-related deaths and hospital admissions for opioid addiction both increased five-fold. Thanks, Doc.

COME ON, MAN. IT'S JUST ONE MORE PILL AND IT MIGHT HELP SOMETHING.

A daily multi-vitamin may have benefits but protection from a cardiovascular crisis isn't one of them. A report in the Journal of the American Medical Association by an epidemiology team at Harvard University found no cardiovascular benefit from a multi-vitamin vs a placebo. The researchers evaluated a randomly assigned group of 14,000 men for risk of heart attack, death from a heart-episode, or stroke. The study extended over 11 years and the multi-vitamin was found no more effective than the placebo.

"SPONGE COUNT IS OK, BUT HAS ANYONE SEEN MY GLASSES?"

A research team from Johns Hopkins University School of Medicine wanted to quantify "never events" that occur in operating rooms around the country. Such mistakes are things that should never happen, eg, wrong patient, wrong extremity, or wrong procedure. Collecting data from the National Practitioner Data Bank, the national repository of malpractice judgments and out-of-court settlements, the team identified 9,744 cases between 1990 and 2010. Reporting in the journal *Surgery*, they found 6% of patients died, 32.9% had permanent injury, and 59.2% suffered temporary injury. A foreign body left behind occurred in 49.8%, wrong procedure 25.1%, wrong site 24.8%, and wrong patient 0.3%. Typically, many problems are only discovered when a patient has a complication such as poor wound healing or infection. Total malpractice payments came to \$1.3 billion with a mean payment of \$133,055. The actual number of "never" events is almost surely higher since many patients never file claims after errors. Hospitals have been working on projects to reduce such events, including "time outs," use of bar codes, and wand-like body scanners that can locate retained material. Nothing is foolproof because fools are so creative.

SMOKING IS ONE OF THE LEADING CAUSES OF STATISTICS.

Teen smoking is falling. The annual survey report from the National Institute of Drug Abuse (NIDA) conducted by the University of Michigan reported on teenagers who admitted smoking cigarettes in the preceding 30 days. In 2011 the number was 11.7%, and in 2012 it fell to 10.6%. This may appear minuscule, but represents a drop

of 9% in a single year! The study tracks tobacco, alcohol, and other drug abuse among 45,000 students in 8th, 10th, and 12th grades. The downside of the report was marijuana use. Almost 23% of high school seniors confessed to using marijuana in the prior 30 days. Nora Volkow, director of NIDA, is worried that many teenagers no longer view pot as dangerous since it is now legalized for recreational use in Colorado and Washington.

I READ IT ON THE INTERNET. IT MUST BE TRUE.

Cardiologists have been lecturing about good and bad cholesterol for decades: high density lipoproteins (HDL) are good and low density lipoproteins (LDL) are bad. Hold on, doctor! Now an international team, reporting in *Lancet*, looked at medical data from thousands of people with or without a history of heart attacks. The collection included some with higher-than-average HDL. Data supports lowering LDL to reduce heart attack risk. HDL is not so clear. Researchers found that having naturally higher HDL imparted no added protection against heart attacks. Activities that increase HDL – exercising, losing weight and stopping smoking – also do their part to protect against heart attacks. It is hard to discern how much protection HDL actually provides on its own. These new findings raise the possibility that having high HDL might simply be a sign of something else that is going right in the body.

WHY IS MY BROW STILL WRINKLED, DOC?

The latest report from the US Food and Drug Administration (FDA) includes an alert regarding illicit Botox. Canada Drugs, a 10-year-old internet pharmacy headquartered in Winnipeg, has profited big time in selling cheaper, foreign knock-offs of popular medicines to American customers and doctors. FDA considers the activity illegal even when the drugs are authentic, because they aren't approved by the agency. Last year the FDA informed cancer doctors that they had bought a cornstarch-based imitation of Avastin. This time it's Botox. Recently the FDA informed 350 medical practices they may have purchased a potentially counterfeit version of the injectable paralytic.

SEX IS THE GREAT AMATEUR ART.

Rachel Jones and her team at Rutgers University produced a 12 part dramatic video series that promoted safer sexual decisions. The soap operas followed four heroines navigating through relationship dilemmas with men. Women who watched the series had 19% fewer risky sexual encounters – unprotected sex with drug users or men identified as promiscuous – than those who only received text messages about preventing HIV. "The women loved the videos. They watched most two or three times." Moreover, this dramatizes an effective method for public education that should be expanded.

HE SHOULD HAVE MADE NOISE LIKE A HIPPO.

The Plymouth Herald reported the arrest of a 48 year-old man urinating against a wall. Prosecutor Jennie Cater said, "He was spraying urine to and fro over the flower beds while making noise like an elephant." The court heard that a public toilet was open across the square. A "shocked and distressed" couple with their 5-year-old daughter, reported the man to police. The attorney for the man stated that he had a "raging alcohol problem" but seems to have turned the matter around. Better turning it around than being cut-off.

ADDENDA

- Largest empire in human history: the British empire of the 19th century.
- Four out of five migraine sufferers are female.
- Last year airlines collected \$3.4 billion in baggage fees.
- My daughter is a vegetarian. She always leans toward sunlight.
- You know "that look" when women want sex? Me neither.
- I like Mexican food, but only from the waist up.
- You never see a homeless guy with a bottle of Gatorade.

ALOHA AND KEEP THE FAITH *rt*

(Editorial comment is strictly that of the writer.)

HELPING YOU FIND YOUR WAY



The information environment faced by physicians has undergone a radical transformation over the past decade. The emergence of profiling, guidelines, online information systems, and other novel sources of information against the backdrop of changes in the health care delivery system have created an environment rich with diversity and challenges. The electronic information age is transforming the medical world and HMSA is striving to make it as easy as possible for our providers to adapt. We have introduced programs, tools, and support to help you provide the best care and alleviate physician overload.

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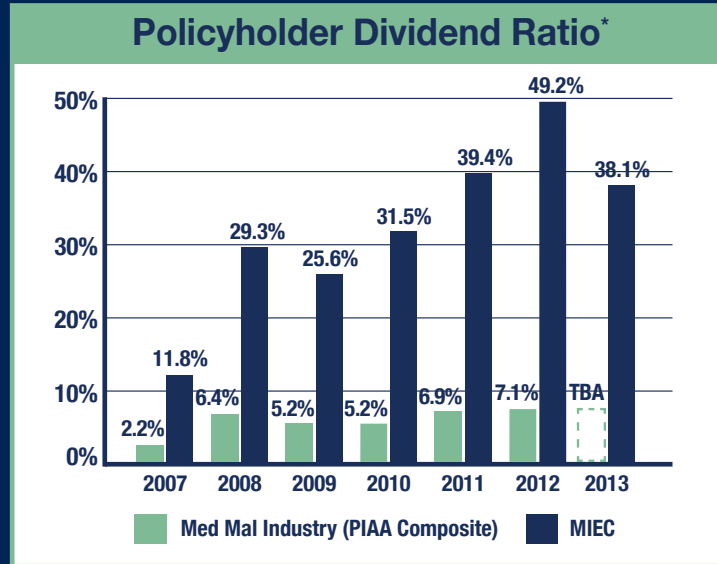
Tools

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