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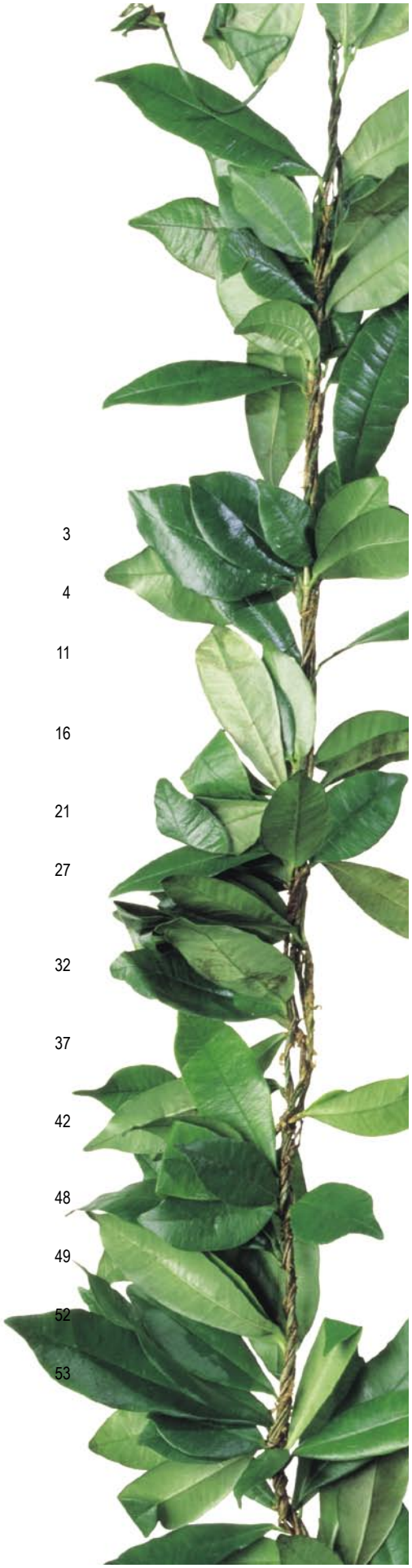
HAWAI'I INITIATIVE FOR CHILDHOOD OBESITY RESEARCH AND EDUCATION (HICORE)



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A Journal of Asia Pacific Medicine

The Journal's aim is to provide new scientific information in a scholarly manner, with a focus on the unique, multicultural, and environmental aspects of the Hawaiian Islands and Pacific Rim region.

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Guest Editor's Message

Raul Rudoy MD, MPH

Obesity is a serious and growing health problem in Hawai'i. Yearly prevalence rates indicate that we are rapidly approaching a situation that will be difficult to reverse, particularly in certain sectors of our community where the rate of obesity is more than 35%.

The purpose of this supplement is to start to look at and evaluate evidence of the burden of obesity in Hawai'i and to present potential options for the management of obesity at the community level. It represents the efforts of local researchers, it provides an excellent overview of the obesity situation in Hawai'i, and it helps us to elucidate some of the social factors influencing the rate of obesity in Hawai'i.

The importance of understanding the effect of community social factors in the prevalence of obesity is difficult to overestimate. Therapeutic interventions depend upon having a clear and vast knowledge of the factors responsible for the obesity epidemic. A central concept in understanding obesity is the recognition that obesity is in great part caused by societal factors that reside outside the control of a particular individual.

The current approach of identifying isolated individuals risk factors and developing programs to change their individual behavior is only partially effective in decreasing the prevalence of obesity at the community level. Changes made at the level of the individual usually do not affect or modify society risk factors for obesity and as soon as one individual leaves the obesity pool another one will enter the pool. This cycle will continue to repeat until changes are made in the basic social structure that places the individual at risk. Poverty, inadequate access to healthy food, and marginal health education are some of the community social determinants that have been associated with obesity.

I believe that the time has come for us to make changes and to stop having a Marie Antoinette kind of attitude ("let them eat cake" or in the case of obesity, "let them eat fast food"); that we should put most of our efforts into creating a coalition of community members, politicians, researchers, business persons, and health insurance representatives to look at the problem; not only at the level of the individual but as a global societal problem, and ask the coalition to be responsible for producing sound health policies that empower the community and that will result in a decrease in the burden that society places on the sector of our population with limited health resources. Perhaps then, we will see a real change in the prevalence and a subsequent decrease in the morbid conditions associated with obesity. It will take time, money, and considerable human effort, but the alternative of doing nothing is not very appealing.

The editors are in debt to the reviewers for their thoughtful comments, to the Hawai'i Medical Journal for permitting us to publish this supplement and to the HMSA Foundation for their continued support.

Dr. Rudoy has no relevant financial relationships or commercial interest to report.

Aloha (Unconditional Compassion)

Adolescent At-Risk Weight (Overweight and Obesity) Prevalence in Hawai'i

Claudio Nigg PhD; Becky Shor MPH; Cathy Yamamoto Tanaka MPH, MBA; and Donald K Hayes MD, MPH

Abstract

Objective: To present prevalence rates of adolescents in Hawai'i at-risk weight (85 percentile or higher = overweight or obese) and the relationship with comorbidities.

Methods: The Hawai'i Youth Risk Behavior Survey aggregated for 2005, 2007, and 2009 was analyzed addressing at-risk weight prevalence by sex, race/ethnicity, and grade. Comorbidities were related to at-risk weight using regression.

Results: Over 1/4 of Hawai'i adolescents were at-risk weight. There were no differences by grade, but boys had higher prevalence (31.0%) than girls (22.4%). Overall, Other Pacific Islanders and Hawaiians had the highest prevalence (43.9% and 37.4%, respectively), followed by multi-race (27.1%), Filipino (25.7%), and Whites with the lowest (16.1%). Most associations between at-risk weight and various co-morbidities (including sexual behavior, nutrition, physical activity, mental health, bullying, alcohol, and other drug use) were not significant (p>.05). However, girls and boys trying to lose weight; and boys with 3+ hours of screen time (TV, video, or computer games) each day were at increased odds of at-risk weight (p<.05).

Conclusion: Adolescent gender and ethnic disparities exist such that a single intervention approach (one size fits all) may be counterproductive. More research is required on the determinants and mechanisms to guide weight management interventions.

Introduction

Childhood overweight/obesity has detrimental physical, mental, and related chronic illness consequences. For instance, 60% of overweight/obese children show at least one cardiovascular disease risk factor[1] and an estimated 1/3 of all US children are expected to eventually develop type 2 diabetes.[2] Multiple studies among youth report a clustering of obesity-related illnesses, such as elevated systolic blood pressure, total and LDL-cholesterol, and plasma insulin.[3,4] Additionally, persistently elevated blood pressure occurred approximately nine times more frequently among overweight/obese children compared to normal weight children.[5] Overweight/obese children are also more likely to experience negative social and psychological consequences, including discrimination, stigmatization, and low self-esteem.[6-9] If weight gain continues through adolescence, there is a significantly high likelihood these youth will become obese adults.[10,11] Obese adults are at increased risk for the premature development of several chronic diseases, including heart disease, stroke, osteoarthritis, and various forms of cancer.[12,13] Thus, preventing childhood overweight/obesity is crucial to the future health of our nation.[14]

Even with the aforementioned facts, the United States is facing a childhood obesity epidemic across gender, socioeconomic strata, and ethnicity.[15-19] The prevalence of overweight/obesity has doubled among preschool-aged children and tripled among children (6 to 11 years old) in just the last 20-years.[15,16] Child overweight/obesity is more prevalent among ethnically diverse children compared to Caucasians,[15,16] with a higher susceptibility among Native Hawaiian and other Pacific Island children.[20] The obesity epidemic is more severe in Hawai'i compared to elsewhere,[21] with obesity-related illnesses disproportionally affecting Native Hawaiian, other Pacific Islander, and Asian populations.[22,23] Given the projected growth of these minority populations[24] and large variability in their health, health behavior, and biological/cultural influences, it is critical for obesity research to distinguish between these ethnicities and to investigate the determinants to inform programs and practitioners. Hawai'i is an ideal location to study these distinctions, with the majority of the population being Native Hawaiian, Other Pacific Islander, or Asian.

However, there has been a lack of information published regarding representative prevalence rates across the state with the most recent being in 2002-2003 and focusing on children entering kindergarten[21] or only focusing on specific parts or subgroups in Hawai'i.[25] No data has been published regarding obesity in adolescents. Therefore, the purpose of this paper is to present the most up-to-date representative statewide adolescent obesity prevalence rates. To provide a more complete picture, co-morbidities of obesity were also presented. It was hypothesized that students with co-morbidities were more likely to be obese compared to students without co-morbidities.

Methods

Sample and Study Design

Data from the publicly-available, anonymously-collected 2005 (n=1662), 2007 (n=1191), and 2009 (n=1511) Hawaii high school-based Youth Risk Behavior Survey were analyzed, IRB exempt. The YRBS is part of the Youth Risk Behavior Surveillance System, which is an epidemiologic surveillance system that was established by the Centers for Disease Control and Prevention (CDC) to monitor the prevalence of youth health behaviors. The YRBS focuses on priority adolescent health-risk behaviors that result in the most significant mortality, morbidity, disability, and social problems during both adolescence and adulthood. In Hawai'i, the survey employs a two stage cluster sample design to produce a statewide representative sample of public high school students in grades 9–12. Survey procedures were designed to protect the students' privacy by allowing for anonymous and voluntary participation. Students complete the self-administered questionnaire in their classrooms during a regular class period and record their responses directly on an answer sheet. Parental permission is obtained before survey administration. In all three years of data, Hawai'i met the CDC requirement of a response rate of at least 60%. The questionnaire used in the YRBS surveys has high reliability with three-fourths of the items having kappas=61–100%.[26] Detailed information about the sampling and survey methodology in the YRBS can be found elsewhere.[27]

Measures

At-Risk Weight

To assess at-risk weight reported on the 2005, 2007, and 2009 Hawai'i YRBS, students were asked "How tall are you without your shoes

on?" and "How much do you weigh without your shoes on?" Body Mass Index (BMI) percentile was then calculated based on students' self-reported height and weight, age and sex as described by CDC (2009). Students less than the 5th percentile of BMI were classified as Underweight; those between the 5th and less than 85th percentile of BMI were classified as Normal Weight; those between the 85th to less than the 95th percentile were classified as Overweight; and those equal to or greater than the 95th percentile were classified as Obese. For the purposes of this analysis students greater than or equal to the 85th percentile of BMI (Overweight and Obese) were classified as "At-Risk Weight."

Race/Ethnicity

The Hawaii YRBS Questionnaire asks students "What is your race?" Response choices are: American Indian or Alaska Native; Black or African American; Filipino; Japanese; Native Hawaiian/Part Hawaiian; Other Asian; Other Pacific Islander; White. Students may select as many responses as they want. Due to sample size considerations, this analysis grouped students into: White, Filipino, Japanese, Hawaiian/Part Hawaiian, Other Pacific Islanders, Multiple and Other categories. If a student selected more than one category, they were classified as Multiple. Because some of the categories represent a specific ethnic group, we identified this demographic measure as "race/ethnicity."

Trying to Lose Weight

Students are asked: "Which of the following are you trying to do about your weight?" Response choices include: lose weight, gain weight, stay the same weight, and I am not trying to do anything about my weight. Students who responded "lose weight" were categorized as "trying to lose weight" and compared to students whose response was any of the other three options.

Screen Time

Two questions assessed screen time. "On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Include activities such as Nintendo, Game Boy, PlayStation, Xbox, computer games, and the Internet.)" and "On an average school day, how many hours do you watch TV?" Response choice are: I do not play video or computer games or use a computer for something that is not school work (for the former question) or I do not watch TV on an average school day (for the latter question), Less than 1 hour per day, 1 hour per day, 2 hours per day, 3 hours per day, 4 hours per day or 5 or more hours per day. Students who had a total of 3 hours or more of television and/or computer were classified as greater than or equal to 3 hours of screen time on an average school day.

Incident Tobacco Use

Students are asked: "During the past 30 days, on how many days did you smoke cigarettes?" They are also asked "During the past 30 days, on how many days did you use chewing tobacco, snuff, or dip, such as Redman, Levi Garrett, Beechnut, Skoal, Skoal Bandits, or Copenhagen?" Response choices for both questions are: 0 days, 1 or 2 days, 3 to 5 days, 6 to 9 days, 10 to 19 days, 20 to 29 days, All 30 days. If a student responded one or more days to either question, they were classified as an incident tobacco user and compared to those who had not used any tobacco in the previous 30 days.

Due to the many co-morbidities investigated, all other measures are presented in Appendix A.

Statistical Analyses

The 2005, 2007, and 2009 data were analyzed in aggregate to increase sample size and provide more stable estimates for population subgroups. All questions were asked identically each year allowing for rational aggregation. The year of the survey was added as a third level of cluster design to create an additional stratum of time and account for the aggregation of multiple years of data. Weighted estimates with 95% confidence intervals were calculated. Prevalence estimates were calculated by sex, race/ethnicity, and grade, as well as for each co-morbidity. Unadjusted and adjusted odds ratios and 95% confidence intervals were calculated for categorical variables to determine the association between at-risk weight and the covariates. Logistic regressions were used to control for multiple confounders (sex, race/ethnicity, grade) simultaneously. Due to observed differences between males and females, additional models were run stratified by sex. These were adjusted for race/ethnicity as the other available covariate, grade, did not show interaction with at-risk weight and was not significant in the crude models of association. Data based on a denominator of fewer than 100 students are considered statistically unreliable and are suppressed.[29] To account for the complex sampling design of this survey; and to obtain accurate prevalence and variance estimates and test statistics, data were analyzed by SUDAAN 10.0 (Research Triangle Institute, Research Triangle Park, North Carolina, USA).

Results

Overall, 26.8 % (95%CI: 24.8-28.8) of high school students in Hawai'i were of at-risk weight. There was a higher prevalence of at-risk weight amongst boys (31.0%) than girls (22.4%). Students from Pacific Islands other than Hawai'i reported the highest level of at-risk weight (43.9%) and White students reported the lowest prevalence (16.1%). No differences were seen in prevalence of at-risk weight between students of different grade levels (Table 1).

Table 1 also shows the prevalence of at-risk weight by various demographics and co-morbidities. Appendix A lists all comorbidities analyzed. Amongst students who reported trying to lose weight, 38.9% were of at-risk weight compared to 24.2% of those not trying to lose weight. Almost 30% of those students who had 3 or more hours of screen time each day were at-risk weight, whereas 25% of those who had less screen time reported at-risk weight. Finally, 32.9% of students who had used tobacco in the previous 30 days were at-risk weight compared to only 25.4% who had not used tobacco. These were all statistically significant differences ($p<.05$).

Looking separately at boys and girls (Table 2), 38.4% of Hawaiian and 34.6% of Other Pacific Island girls reported being of at-risk weight, while only 8.7% of white girls reported at-risk weight. Boys showed a similar pattern, with 53.4% of Other Pacific Island and 36.6% of Hawaiian boys reporting at-risk weight. White boys had the lowest reported prevalence of at-risk weight at 22.4%.

Amongst girls, 32.9% of those trying to lose weight were of at-risk weight compared to 19.2% who were not trying to lose weight. 47.2% of boys were of at-risk weight amongst those trying to lose weight compared to 28.5% of those who were not trying to lose weight.

Table 1. Sample Size, Prevalence Estimates and Crude Odds of At-Risk Weight, ‡ Hawaii YRBS 2005, 2007, 2009				
Variable	**N**	**% At-Risk Weight (95% CI)**	**Crude Odds of At-Risk Weight (95%CI)**	**Adjusted Odds ± of At-Risk Weight (95%CI)**
Overall	4364	26.8 (24.8-28.8)		
Gender				
Female	2335	22.4 (19.9-25.0)	referent	Referent
Male	2015	31.0 (28.5-33.4)	**1.6 (1.3-1.8)**	**1.6* (1.3-1.8)**
Grade				
9th	1423	27.9 (24.2-31.8)	1.2 (0.9-1.6)	
10th	1030	26.7 (23.6-29.9)	1.2 (0.9-1.5)	
11th	897	27.9 (24.3-31.8)	1.2 (0.9-1.6	
12th	968	24.0 (20.2-28.3)	referent	
Race/Ethnicity				
White	425	16.1 (12.6-20.2)	referent	Referent
Filipino	745	25.7 (22.5-29.2)	**1.8 (1.3-2.6)**	**1.8** (1.3-2.5)**
Japanese	409	19.0 (15.3-23.3)	1.2 (0.8-1.8)	
Hawaiian	490	37.4 (31.8-43.3)	**3.1 (2.2-4.5)**	**3.2** (2.2-4.5)**
Other Pacific Islander	320	43.9 (38.1-49.8)	**4.0 (2.8-6.0)**	**4.2** (2.9-6.1)**
Multiple	1390	25.1 (22.3-28.2)	**1.8 (1.3-2.3)**	**1.8** (1.4-2.4)**
All Other	387	21.3 (16.6-26.8)	**1.4 (1.0-2.1)**	1.4** (1.0-2.1)
Sexual Violence				
Yes	440	26.6 (24.6-28.7)	1.0 (0.8-1.3)	
No	3846	26.8 (21.9-32.4)	referent	
Intimate Partner Violence				
Yes	396	23.9 (18.8 -30.0)	0.9 (0.7-1.3)	
No	2268	25.0 (22.6-27.7)	referent	
Trying to Lose Weight				
Yes	765	38.9 (35.2-42.7)	**2.0 (1.7-2.4)**	**1.9† (1.6-2.3)**
No	3472	24.2 (22.2-26.3)	referent	
Depressed				
Yes	1373	28.8 (25.6 -32.2)	1.2 (1.0-1.4)	
No	2879	26.1 (23.8-28.5)	referent	
Suicide Ideation				
Yes	850	28.7 (24.6-33.1)	1.1 (0.9-1.4)	
No	3463	26.5 (24.4-28.8)	referent	
Bullied Physically				
Yes	931	28.0 (23.7-32.8)	1.1 (0.9-1.4)	
No	3423	26.4 (24.2-28.6)	referent	
Screen Time				
>=3 hrs/day	1428	29.8* (26.6-33.2)	**1.2 (1.0-1.5)**	**1.3† (1.1-1.6)**
<3 hrs/day	2793	25.4 (23.0-28.0)	referent	
Nutrition Index				
Ate >=5 Fruit/Veg Daily	741	28.3 (23.6 - 33.4)	1.1 (0.9-1.4)	
Ate < 5 Fruit/Veg Daily	3416	26.4 (24.5 - 28.5)	referent	
Physical Activity Index				
>=60 min/Day	1342	27.6 (25.3-29.9)	0.9 (0.7-1.1)	
<60 min/Day	2885	25.8 (22.3 -29.7)	referent	
Age Sexual Onset				
<=13	424	32.3 (25.8 - 39.5)	1.4 (1.0-2.0)	
>13	988	25.5 (22.3 - 28.9)	referent	

# Sexual Partners				
>=3	525	32.4 (27.4-37.8)	1.4 (1.1-1.8)	
<3	879	25.6 (21.7-30.0)	referent	
Drank Before Sex				
Yes	305	33.1 (26.2-40.7)	1.4 (1.0-2.0)	
No	1096	26.2 (23.2-29.4)	referent	
Use Condoms				
Yes	723	29.2 (24.8-34.1)	referent	
No	661	27.7 (23.9-31.8)	1.1 (0.8-1.5)	
Lifetime Alcohol Use				
Yes	2606	27.6 (24.9-30.6)	1.1 (0.9-1.4)	
No	1460	25.4 (23.2-27.8)	referent	
Incident Alcohol Use				
Yes	1314	26.7 (23.8-29.9)	1.0 (0.9-1.2)	
No	2625	25.9 (23.7-28.2)	referent	
Lifetime Marijuana Use				
Yes	1408	27.8 (24.9-31.0)	1.1 (1.0-.3)	
No	2781	25.6 (23.4-27.9)	referent	
Incident Marijuana Use				
Yes	733	28.8 (25.2-32.7)	1.2 (0.9-1.4)	
No	3463	26.0 (23.8-28.2)	referent	
Incident Tobacco Use				
Yes	668	32.9 (28.7-37.4)	**1.4 (1.2-18)**	**1.3† (1.1-1.6)**
No	3638	25.4 (23.4-27.5)	referent	

‡ Risk weight are those students greater than or equal to the 85th percentile of BMI. ± Adjusted Odds were not calculated if Crude odds were not significant at p<.05. CI=confidence interval. P-values significant at p<0.05 are **bolded**. * Adjusted for ethnicity. ** Adjusted for sex. †Adjusted for sex and ethnicity.

Table 2. Prevalence and Odds of At-Risk Weight‡ by Sex, Hawai'i YRBS 2005-2009

Variable	**Girls**				**Boys**			
	N	% At-Risk Weight (95% CI)	Crude OR (95% CI)	Adjusted* OR (95% CI)	N	% At-Risk Weight (95% CI)	Crude OR (95% CI)	Adjusted* OR (95% CI)
Race/Ethnicity								
White	219	8.7 (5.8-12.8)	referent		206	22.4 (17.6-28.0)	referent	
Filipino	373	17.7 (14.3-21.8)	2.3 (1.3-3.9)		372	32.1 (28.1-36.5)	1.6 (1.1-2.4)	
Japanese	219	12.1 (7.6-18.7)	1.4 (0.7-2.7)		189	25.5 (19.8-32.2)	1.1 (0.7-1.9)	
Hawaiian	251	38.4(31.7-45.6)	6.6 (4.1-10.6)		237	36.6 (28.3-45.8)	2.0 (1.2-3.3)	
Other Pacific Islander	179	34.6 (26.2-44.1)	5.6 (2.9-10.9)		139	53.4 (46.3-60.4)	4.0 (2.7-5.8)	
Multiple	805	23.2 (20.1-26.7)	3.2 (2.1-4.8)		582	27.4 (23.0-32.2)	1.3 (0.9-1.9)	
Other	191	17.4 (12.8-23.2)	2.2 (1.2-4.0)		193	24.8 (17.8-33.4)	1.1 (0.7-1.9)	
Lose Weight								
Yes	219	32.9 (27.4-38.8)	2.1 (1.5-2.8)	1.8† (1.3-2.5)	206	47.2 (40.6-53.9)	2.2 (1.7-3.0)	2.1† (1.5-2.9)
No	765	19.2 (16.8-21.9)	referent	referent	710	28.5 (25.8-31.3)	referent	referent
Screen Time								
>=3 hrs/day	757	23.4 (19.8-27.5)	1.1 (0.8-1.4)	n/a	665	35.8 (31.7-40.2)	1.4 (1.1-1.8)	1.3† (1.1-1.6)
<3 hrs/day	1522	22.2 (19.3-25.3)	referent	referent	1263	28.6 (25.2-32.2)	referent	referent
Tobacco Use								
Yes	360	32.2 (24.7-40.8)	1.9 (1.3-2.7)	1.5† (1.0-2.1)	733	34.0 (27.8-40.8)	1.2 (0.9-1.7)	n/a
No	1948	20.3 (18.1-22.8)	referent	referent	3463	30.0 (27.4-32.7)	referent	referent

OR=odds ratio; CI=confidence interval; ‡ at-risk weight are those students greater than or equal to the 85th percentile of BMI. OR significant at p<0.05 are **bolded**. *Adjusted Odds not calculated for race/ethnicity models as data is stratified by sex, and grade was not a significant predictor of at-risk weight. For other models in this table, adjusted odds only calculated when corresponding crude odds was statistically significant at p<0.05. † Adjusted for race/ethnicity

Only boys showed significant difference in prevalence of at-risk weight when assessing screen time. Of those who watched 3 or more hours of television each day 35.8% were of at-risk weight compared to 28.6% who watched less television.

Only girls showed significant difference in prevalence of at-risk weight when assessing smoking. Girls who smoked cigarettes (32.2%) showed a significantly increased prevalence of at-risk weight compared to girls who did not smoke cigarettes (20.3%).

Crude logistic regression analysis showed that, overall, males had 1.6 times the odds of being of at-risk weight compared to females (Table 1). In addition, compared to Whites, Filipinos had 1.8 times the odds, Hawaiians 3.1 times the odds, Other Pacific Islanders have 4.0 times the odds, students of multiple ethnicities had 1.8 times the odds and all others had 1.4 times the odds for being of at-risk weight. Those who were trying to lose weight were at 2.0 times the odds for being of at-risk weight, and those who watched 3 or more hours of television each day were at 1.2 times the odds for being of at-risk weight. Finally, students who used tobacco in the previous thirty days had 1.4 times the odds to being of at-risk weight. These were all statistically significant odds ($p<.05$). No other covariates showed statistically increased odds for being of at-risk weight in the crude models.

Sex-specific crude logistic regression models (Table 2) indicated that for girls, Filipinos had 2.3 times the odds, Hawaiians had 6.6 times the odds, Other Pacific Islanders have 5.6 times the odds, multiple ethnicities had 3.2 times the odds, and all others had 2.2 times the odds for being of at-risk weight compared to whites. Crude models for boys by ethnicity showed Filipinos had 1.6 times the odds, Hawaiians had 2.0 times the odds, and Other Pacific Islanders had 4.0 times the odds for being of at-risk weight compared to white students. These were all statistically significant increased odds ($P<.05$). Adjusted models were not calculated because data was stratified.

Both boys and girls who were trying to lose weight had approximately 2 times the odds for being of at-risk weight. After adjustment for ethnicity, girls had 1.8 times the odds for being of at-risk weight and boys had 2.1 times the odds.

Inexact models for boys indicated that students who reported 3 or more hours of screen time each school day had 1.4 times the odds of reporting at-risk weight compared to male students who had less screen time. After adjustment for ethnicity, the odds of at-risk weight did not significantly change. Girls did not show increased odds of at-risk weight based on screen time.

Finally, girls who had used tobacco in the 30 days prior to the survey, had 1.9 times the odds of reporting at-risk weight compared to girls who had not used tobacco. These odds were no longer statistically significant after adjustment for ethnicity. Boy tobacco users did not have significantly different odds of at-risk weight compared to boy tobacco non-users.

Discussion

The authors presented that over 1/4 of the adolescent population in Hawai'i is at-risk weight (overweight and obese, 85 percentile or higher of BMI) in the state of Hawai'i. This compares to the national levels (27.8%).[30] Additionally, almost 1/3 of adolescent boys were at-risk weight also mirroring national trends. Further, this paper shows estimates of at-risk weight and commonly associated outcomes were different by gender and ethnicity. In terms of ethnicity, Other Pacific Islander and Hawaiian/part Hawaiian were the most prevalent categories with at-risk levels of 43.9% and 37.4%, respectively. This represents prevalence rates 10% higher than the rest of the adolescent population in Hawai'i. These findings confirm data from other age groups[21,22,31] and illustrate the ethnic disparities present in this state. Further, there are disparities within the Asian group. Disaggregating the Asian group, there were significant differences between Japanese and Filipino—the only two groups for which the sample size was sufficient (after combining 3 years of data) to allow individual estimates, with the Filipino at greater risk. Exploring other Asian subgroups is recommended. The finding that those of mixed ethnicities are more at-risk weight, especially girls, compared to Caucasians, requires further research regarding more or less protective combinations and plausible explanations. One of the most concerning data is the likelihood (odds ratio) of Hawaiian and other Pacific Island adolescent girls to be at-risk weight. It is about twice as high as the next ethnic group. Clearly more research needs to address the bio-psycho-social-environmental determinants in this specific subpopulation in order to understand and appropriately address these groups.

The authors hypothesize that those with co-morbidities would be more likely to be at-risk weight compared to those not at weight risk was largely not confirmed. This is somewhat surprising as this included sexual behavior, nutrition, physical activity, mental health, bullying, alcohol, and other drug use. This finding is likely due to how we grouped the data — at-risk weight including overweight and obese — whereas the co-morbidities may be more pronounced in the obese subgroup. Another possible reason for our findings may be that our co-morbidities may present in a more complex manner such as moderated mediation. For example, it may be that males who do not engage in physical activity are more likely to be at-risk weight. However, our results may indicate that the investigated risk factors should not be thought of as markers for overweight or obesity. Adolescents who have these risk factors are as likely to be at weight risk as they are not.

The few differences that were found included that adolescents (boys and girls) who are attempting to lose weight are more likely to be at-risk weight. Resources should be provided to help these adolescents who are motivated to progress and become successful. Specifically, smoking needs to be taken into consideration when addressing weight for girls and sedentary behaviors needs to be addressed for boys. These differences may illustrate some of the leisure time choices that the girls and boys are choosing to engage in which each promote overweight and obesity through different mechanisms. Identification of alternate activities may be required to replace these unhealthy behaviors.

Some limitations should be considered when interpreting the results of this study. The self-reported nature of the study may have biased the data and relationships somewhat, but to what extent is unclear. The cross-sectional nature does not allow us to make any causal inferences of whether the co-morbidities lead to at-risk weight or whether they are a consequence thereof. The collection and categorization of race/ethnicity, although common practice, is not without limitations. Further, even though we pooled the data over three YRBS administration years, the sample size limited reporting on specific subpopulations. Relatedly, this data is representative of

public school students for which parental consent was obtained and may not be generalizable to all high school students in the state. Finally, other variables not investigated may play an important role such as socioeconomic status.

These limitations notwithstanding, several conclusions derive from the current study. The prevalence of overweight and obese adolescents in the state of Hawai'i resembles that of the nation. Gender and ethnic disparities exist such that a single intervention approach (one size fits all) may be counterproductive. More research is required on the determinants and mechanisms to guide interventions in this developmental stage of life.

Authors' Affiliation:
- John A. Burns School of Medicine, University of Hawai'i, Honolulu, HI (C.N.)
- Hawai'i State Department of Health, Honolulu, HI (B.S., C.Y.T., D.K.H.)

Correspondence to:
Claudio Nigg PhD; 1960 East-West Road, Honolulu, HI 96822;
Ph: (808) 956-2862; Email: cnigg@hawaii.edu

Disclosure Statement

None of the authors identify any conflict of interest.

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'Āina (Sacred Land)

Appendix A. Table of Measures			
Measure	Survey Question	Response Choices	Categorizations
Sexual Violence	Have you ever been physically forced to have sexual intercourse when you did not want to?	Yes ; No	Students who responded "yes" were compared to students who responded "no"
Dating Violence	During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?	Yes ; No	Students who responded "yes" were compared to students who responded "no". This is subset only to students who responded "yes" to the question "During the past 12 months, did you have a boyfriend or girlfriend?"
Depression	During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?	Yes ; No	Students who responded "yes" were compared to students who responded "no"
Suicide Ideation	During the past 12 months, did you ever seriously consider attempting suicide?	Yes ; No	Students who responded "yes" were compared to students who responded "no"
Bullied Physically	During the past 12 months, how many times has someone tried to hurt you by hitting, punching, or kicking you while on school property?	0 times; 1 time; 2 or 3 times; 4 or 5 times; 6 or 7 times8 or 9 times; 10 or 11 times; 12 or more times	If students responded 1 or more times, they were grouped as having been physically bullied.
Bullied Verbally	During the past 12 months, how many times has someone tried to hurt you by saying mean things to you (things that hurt your feelings) while on school property?	0 times ; 1 time; 2 or 3 times; 4 or 5 times; 6 or 7 times ; 8 or 9 times ; 10 or 11 times; 12 or more times	If students responded 6 or more times, they were grouped as having been verbally bullied. Only asked 2005 and 2007
Supportive Adult	Outside of school, is there an adult you can talk to about things that are important to you?	1) Yes 2) No	Students who responded "yes" were compared to students who responded "no". Only asked 2007 and 2009
Nutrition Index	Percentage of students who ate fruits and vegetables five or more times per day during the past seven days.	Yes ; No	This index is based on 5 nutrition question regarding, carrot, potato, fruit, green salad, other vegetables and indicates that the student ate five or more servings of fruits and vegetables a day, on average, over the past seven days. The index is 1 when they meet these conditions and two otherwise. If any of the variables are missing then the index is missing. The denominator is all students.
Physical Activity Index	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	0 days ; 1 day ; 2 days ; 3 days; 4 days; 5days; 6 days; 7 days	Students who were physically active for 5 or more days in the past 7 days were compared to students with less than 5 days of physical activity.
Age of Sexual Onset	How old were you when you had sexual intercourse for the first time?	I have never had sexual intercourse; 11 years old or younger; 12 years old ; 13 years old ; 14 years old ; 15 years old ; 16 years old; 17 years old or older	Students who had sexual intercourse for the first time age 13 or younger were compared to students who were older than 13 at first sexual intercourse
Many Sexual Partners	During your life, with how many people have you had sexual intercourse?	I have never had sexual intercourse; 1 person ; 2 people ; 3 people ; 4 people ; 5 people ; 6 or more	Students who had had sexual intercourse with 3 or more people in their lives were compared to students who had had fewer than 3 sexual partners in their
Drank Before Last Sex	Did you drink alcohol or use drugs before you had sexual intercourse the last time?	I have never had sexual intercourse; Yes ; No	Students who had never had sexual intercourse were excluded from analysis. Students who responded "yes" were compared to students who responded "no".
Condom Use	The last time you had sexual intercourse, did you or your partner use a condom?	I have never had sexual intercourse; Yes ; No	Students who had never had sexual intercourse were excluded from analysis. Students who responded "yes" were compared to students who responded "no".
Alcohol Use – Prevalent	During your life, on how many days have you had at least one drink of alcohol?	0 days ; 1 or 2 days ; 3 to 9 days;10 to 19 days ; 20 to 39 days; 40 to 99 days ; 100 or more days	Students who had had one or more drinks of alcohol in their lives were compared to students who had had no drinks of alcohol in their lives.
Marijuana Use - Prevalent	During your life, how many times have you used marijuana?	0 times ;1 or 2 times ; 3 to 9 times; 10 to 19 times; 20 to 39 times; 40 to 99 times; 100 or more times	Students who had had used marijuana one or more times in their lives were compared to students who had not used marijuana.
Alcohol Use - Incident	During the past 30 days, on how many days did you have at least one drink of alcohol?	0 days ; 1 or 2 days; 3 to 5 days; 6 to 9 days; 10 to 19 days ; 20 to 29 days; All 30 days	Students who had drank one or more drinks in the previous 30 days were compared to students who had not drank alcohol in the previous 30 days.
Marijuana Use - Incident	During the past 30 days, how many times did you use marijuana?	0 times ; 1 or 2 times; 3 to 9 times; 10 to 19 times ; 20 to 39 times; 40 or more times	Students who had used marijuana one or more times in the previous 30 days were compared to students who had not used marijuana in those 30 days.

Perceptions of Middle School Educators in Hawai'i about School-based Gardening and Child Health

Ameena T. Ahmed MD; Caryn E. Oshiro MS, RD; Sheila Loharuka BA; and Rachel Novotny PhD

Abstract

Background: Childhood obesity prevention is a national priority. School-based gardening has been proposed as an innovative obesity prevention intervention. Little is known about the perceptions of educators about school-based gardening for child health. As the success of a school-based intervention depends on the support of educators, we investigated perceptions of educators about the benefits of gardening programs to child health.

Methods: Semi-structured interviews of 9 middle school educators at a school with a garden program in rural Hawai'i were conducted. Data were analyzed using a grounded theory approach.

Results: Perceived benefits of school-based gardening included improving children's diet, engaging children in physical activity, creating a link to local tradition, mitigating hunger, and improving social skills. Poverty was cited as a barrier to adoption of healthy eating habits. Opinions about obesity were contradictory; obesity was considered both a health risk, as well as a cultural standard of beauty and strength. Few respondents framed benefits of gardening in terms of health.

Conclusions: In order to be effective at obesity prevention, school-based gardening programs in Hawai'i should be framed as improving diet, addressing hunger, and teaching local tradition. Explicit messages about obesity prevention are likely to alienate the population, as these are in conflict with local standards of beauty. Health researchers and advocates need to further inform educators regarding the potential connections between gardening and health.

Introduction

Obesity is the most significant nutritional problem in the United States.[1] Within Hawai'i, as across the nation, ethnic minorities are disproportionately affected.[1] The prevalence of adult overweight or obesity on the 2004 Hawai'i Health Survey was 67% among Native Hawaiians, compared to <50% for all other ethnicities.[2] The lower prevalence of obesity among Asians is countered by their development of obesity-related chronic disease at lower BMI.[3-5]

Obesity is the product of disequilibrium in energy intake (food consumed) and expenditure (physical activity, metabolism, and growth and development).[6,7] School-based gardening programs have been proposed as a novel intervention to prevent childhood obesity through promotion of health eating.[8] However, fewer than 40% of school principals and teachers at schools with gardening programs consider production of edible produce one of their program's goals, and most teachers do not believe that gardening programs are effective in promoting healthy eating,[9,10] or that promotion of nutrition or health are among the most important goals of these programs.[11,12] Perhaps because of these beliefs, little research has been conducted on school-based gardening as a nutrition-promoting intervention.

The authors located a middle school gardening program that was conceived and founded as a mechanism to prevent nutrition-related illness. This program is set in Hawai'i Island (population 175,000) at a school that serves a rural, largely lower socioeconomic status (61% of students qualify for federally subsidized lunch programs), and 50% Native Hawaiian student body. A unique aspect of this program is that it explicitly seeks local community input and incorporates a Hawaiian values curriculum. The garden now serves as a model for Hawai'i Island schools. We conducted a qualitative study to examine perceptions of educators about the effects of school-based gardens on children's health, particularly obesity.

Methods

The study was conducted at a Hawai'i Island middle school that implemented a gardening program in 2005. Semi-structured interviews of 9 educators (2 administrators, 4 teachers, and 3 garden staff) were conducted in 2009.

Participants were recruited through snowball sampling, starting with two nodes: the garden leader and the school principal. Interviews explored: (1) definitions of children's health, (2) health consequences of obesity, (3) challenges to improving children's nutrition and health, and (4) effects of school gardening on children's health and development. Interviews lasted 20 – 90 minutes and were audio taped and transcribed. Informed consent was obtained from all participants.

Qualitative analysis of data was based upon a grounded theory approach using descriptive, open coding.[13] This iterative process allowed for collaboration among authors and a thorough analysis. Interview transcripts were read in detail by each author to generate an initial list of themes, which were then grouped into factors influencing health within and outside the school environment. The list of themes was used to develop a conceptual model summarizing attitudes and beliefs about the use of school gardens to improve children's health. When relevant, differences between teachers, school administrators, and garden staff were examined.

This study was approved by the Kaiser Permanente, Hawai'i Institutional Review Board.

Results

Determinants of Health

Teachers, administrators, and garden staff had similar concepts of health and ideas about determinants of child health (Table). Nearly all (7 of 9) participants expressed a holistic definition of health that encompassed general well-being. For instance, one teacher explained, "healthy is [when] your body, mind, and spirit can function at the best capacity every day." All believed parents and family were the strongest influences on children's health, but that teachers often played important roles.

> *Well, I would hope [health promoting influences] come from the family… I would hope that all their values, everything health-wise — mentally, physically, emotionally, and strength — comes from the family. It makes my job a lot easier! — Teacher*

All but one participant stressed the role of peers on health. Most teachers (3 of 4) cited the influence of media on children's health.

Responses diverged when discussing the role of social ties in determining health. Three of four teachers, but only one garden staff and neither administrator, cited a connection to local farming and ranching tradition as a positive influence on health. One teacher

Table. Themes that Emerged from Interviews of Middle School Educators about Gardening and Children's Health

1. Determinants of health
   - Holistic—well-being
   - Physical, emotional, spiritual
   - Family
   - Social: peers, media, community
   - Ties to local traditions
   - Diet and physical activity

2. Programs and policies to improve child health
   - School policy: prohibition of unhealthy foods on campus
   - School environment: cafeteria offerings
   - School curriculum: gardening, physical education and sports
   - Food and agricultural systems change
   - Relationships: teacher-student, nurturing children
   - Community: church

3. Obesity
   - Obesity is a risk to health: diabetes, dyslipidemia, joint pain
   - Obesity is normative
     - Large body size is cultural ideal of beauty, strength
     - Unclear how to define obesity

4. Challenges to improving child nutrition and health
   - Poverty and low socioeconomic status
     - Hunger
     - Lack of knowledge
     - Lack of time for parents to prepare meals
   - School and federal bureaucracy
   - Slow pace of change

5. Benefits of school-based gardening
   - Improved diet and increased physical activity
   - Classroom extension
   - Nutrition and health education
   - Experiential education
   - Catalyst for gradual change of cultural norms around food cultivation and consumption
   - Demonstrates connections
   - Promotes social skills
   - Provides connection to local tradition
   - Improves health of local community

discussed "bonding the kids to what their ancestors used to do" as something that helps children be healthy. Garden staff and administrators mentioned the role of community in influencing children's health.

I think you can get by on nuclear family — many of us do — but I think a healthier environment is more multi-generational and more spread out…. For a kid to have many people in whose presence they feel safe and comfortable and well cared-for adds to their health…. That community, the physical, neighborhood community…is the most basic. — Garden staff

Changes to Improve Health

All respondents cited specific programs, policies, or actions that would improve children's health. All discussed the importance of nurturing teacher-student relationships, availability of healthy and appealing cafeteria offerings, and school-based gardening. Teachers and administrators focused on school policy and curricular changes, such as the importance of school wellness policies that prohibit junk food on campus. Banning junk food on campus has improved children's classroom behavior and ability to concentrate. Administrators and garden staff discussed means to increase physical activity at school, through formal physical education, gardening, extracurricular activities, and noncompetitive games.

Garden staff had broader ideas about potential changes that extended into the food and agricultural system and the local community.

I think the churches are a big part of this food thing…because they serve food after church, they bring food to each other, there's a pulpit, there's an actual pulpit! I think [there is] still a reasonable amount of church-going on the island. And it's a big element if we're going to make this change.

Yeah, so I think people have to get it from all different ways. I mean there would really have to be that commitment. School, church, newspapers, TV, everything.

I work with individuals but I know it's the environment that really either nurtures people vis-à-vis what I consider what's better for them, versus not.

Obesity

Respondents expressed conflicting opinions about the obesity-health relationship, sometimes saying that obesity is a risk to health and at other times saying that "bigness" can be healthy. Several overweight respondents volunteered personal anecdotes about how overweight might be associated with diabetes, high cholesterol, and joint pain, but went on to express mixed feelings when asked explicitly about adverse health effects of obesity.

Being big, myself, does affect health. You have to be more aware, especially when you're big. But it depends. Big people are not necessarily unhealthy. I think it depends on your body weight, I think it depends on your bone structure."—Garden staff

Some respondents expressed uncertainty about what body size was healthy, or cited cultural values of larger size. One administrator said, "I guess the question is how you define obesity," and went on to discuss how "bigness" is considered not just normative but desirable: "Culturally, Hawaiian women, big Hawaiian women are—that's part of the population, that's just part of the culture. Is that healthy? Probably not!" Two other respondents commented on the cultural ideal of big as attractive and obesity and its associated diseases as normative:

I have people who have said to me many times, "oh, my boyfriend doesn't want me to get too thin." Now these are people that are already 200 pounds or more…it's part of the cultural heritage here. — Garden staff

Some ranchers here…love their women stocky, because they can lift, they're strong. — Teacher

Challenges to Improving Nutrition and Health

Poverty, hunger, bureaucracy, and the slow pace of change were cited as challenges to improving child health. All respondents believed that poverty was a significant barrier to parents providing the conditions for good nutrition and health. Lack of parental health knowledge, lack of time to prepare home meals, and the low price of fast food were discussed as impediments to health. All teachers knew children who came to school hungry.

Especially now with the way the economy is [poor], parents are struggling to make ends meet. Sometimes kids don't even have somebody at home making dinner for them because parents are picking up an extra

job. So I definitely think that food, especially healthy food or a balanced meal, is difficult for a lot of our students to get. — Teacher

I have to tell you over the Christmas holiday we had a lot of kids with the economy falling apart dropping by school and saying they were hungry, they hadn't eaten for a couple of days, and I gave them a dollar bill and said "Go get a couple cheeseburgers."… at least to put something in their stomach. — Administrator

All groups cited structural barriers to improving children's health at school. Federally mandated academic testing requirements were seen as a barrier to health, nutrition, and physical education, as resources for these were sacrificed to "teaching to the tests." All groups believed that integration of formal physical education or informal "running around" time into the daily schedule would improve health. Further, lack of ability to influence the school cafeteria, which served high sugar breakfasts and unpalatable lunches, was cited as a barrier to improving nutrition. All garden staff cited didactic, sitting down learning as an impediment to health. One garden staff stated, "making kids sit at desks for six hours a day is a really bad idea." Finally, several respondents acknowledged that culture change is a slow, incremental process: "The garden's only been with us a couple years. We're trying to change a culture here, in a sense, and that's going to take some time."

Benefits of School-based Gardening

All respondents believed that school-based gardening was beneficial to students, though there were differences in the benefits cited. All agreed that improving children's diet and engaging them in physical activity were benefits.

Teachers and garden staff discussed using the garden as classroom extension in which core academic subjects are taught through garden activities, though administrators believed that this integration had not yet been achieved. Not all respondents explicitly linked gardening to health or nutrition education.

I was seeing it as a really substantial K-12 science education program, with social studies and all that kind of stuff. And then M. came in and she started [Garden Program] …She came in from the nutritional health point of view and I thought that was interesting. But I'm not really that focused on health. My own interests are more focused on education than health. — Garden staff

Now it's hit and miss… . I think the kids learn a lot by going [to the garden], but I'm not convinced that it then translates back into what they were studying in the classroom. — Administrator

School-based gardening was felt by all groups to be a catalyst for the gradual change of cultural norms around food.

We've got to start with these kids now, so that when they become the grandparents, they're modeling correctly for the kids. We're probably not going to change the values of today's elderly and today's parents, but if we begin with the kids we're going to have a chance over time to change the health and wellness of the population. — Administrator

Teachers and garden staff also cited anecdotes of how gardening promotes experiential learning for children who don't learn through didactic methods. Gardening enhances learning by demonstrating connections between academic subjects and their real-world applications.

We're really trying to well-round the kids so that they can see the connections… [between] the subject area's curriculum and… everyday life. — Teacher

Seven respondents believed that school gardens increase kids' willingness to try new foods and improves children's diet. The garden leader encourages students to try new foods at least once:

They get to try some things… . At first a lot of them were like "Ew, vegetables, yuck!" But her rule is, try it, and if you don't like it you can spit it out, but at least try it. And so some, it's like "Oh, it's not bad!" And then…they ask her if they can take some home to have their parents taste, or even to grow or plant at home." — Teacher

Teachers and garden staff cited the collective tasks of gardening as promoting social skills. Through the process of preparing soil, planting, cultivating, harvesting, and eating food, children feel a sense of pride, accomplishment, and ownership.

"You have to work together…. It's not about individualism which is promoted in the school structure in some ways, but really communicat[ion], cooperation and ownership of something." — Garden staff

[The Garden Teacher reminds them of] her rules, "be safe," and …so they're always reminding each other, "oh, carry the tool this way," and "hey, don't forget, not over your shoulder"….And they help each other out, too. If they're making the salad and each – "okay, you'll mix the vinegar part," or "you guys make the dressing, and we'll gather the flowers or the extra stuff that we're going to make our salad better with." — Teacher

Several teachers and garden staff, but neither administrator, believed that providing a connection to local and Hawaiian tradition was an important benefit of school gardening.

And the kids need to touch the land. The kids live in a farming community, and they don't know how their food came to be, or how they got the milk, or what have you… . They just didn't know the process. And it was just kind of being lost. We really wanted…[to bring] Hawaiian culture back. And of course, naturally, it's the 'aina, the land. — Teacher

Garden staff additionally considered the garden a resource to improve health in the community. Weekend programs to teach community members about gardening, free food markets that distribute excess produce, and the presence of the garden as community green space were benefits that extended beyond the school. Further, through promoting home food gardens, garden staff saw an explicit link between teaching how to garden and improving food security among the low-income population served by the school.

Discussion

This qualitative study of educators' perceptions of school-based gardening found that middle school teachers, administrators, and garden staff all held holistic views that considered health to be determined by physical, emotional, and spiritual well-being. Teachers and administrators cited school food policy, such as rules about foods that are permitted on campus, and curricular innovations such as teaching nutrition through gardening, as programs that could improve children's health and nutrition. Garden staff additionally cited changes in broader agricultural policy as well as programs

to address hunger and improve food security as means to improve children's diet. Participants held differing opinions about the relationship between obesity and health. Some acknowledged the potential health risks of obesity while simultaneously attributing obesity to "bone structure" or expressing doubt that obesity could be easily defined. Further, cultural standards that associate large body size with beauty, strength, and desirability present a barrier to framing health policies in terms of an obesity-preventing effect.

Study participants were unanimous in the beliefs that parents were the strongest influence on their children's health, and that poverty impeded parents' ability to provide their children the proper nutrition, parental presence, and other conditions necessary for health. Benefits of school-based gardening included improving children's diet, engaging them in physical activity, providing a location for experiential, place-based learning about core academic subjects, creating a link to local tradition, improving social skills, and increasing self-esteem and pride.

This study had several limitations. First, qualitative methods are useful in investigating a topic in depth, while larger, quantitative surveys or other studies would be needed to draw conclusions in a larger group. Second, our study was conducted during a short window of time in a rural, low socioeconomic status, largely non-white community. Study findings cannot necessarily be extrapolated to other settings. However, our findings have applicability to schools that serve other indigenous or rural populations, including both Pacific Island settings as well as those on the mainland. Third, we did not investigate perceptions of child health or school gardening among students or their parents. As parents may be the strongest influence on their children's health, future study should investigate the knowledge and opinions of children and parents about gardening and child health and development.

This study had several strengths. First, it is one of the few studies to investigate perceptions of gardening and health among educators at schools with gardening programs. Second, it adds to the small extant literature on childhood obesity and gardening, and on health among Native populations in Hawai'i. Third, the use of in-depth interviews allowed for the exploration of the topic of child health and gardening in depth.

Conclusions

Effective school-based interventions to address childhood obesity are needed. Making healthy food more easily available and affordable,[14-19] modeling,[20] and increased parental involvement[8,19] help to increase children's intake of healthy foods. School gardening programs model healthy eating, provide healthy food, and teach children the skills to grow their own food at home.[8] While school gardening programs are known to increase children's nutrition knowledge [21-23] and preferences for vegetables,[21-23] few studies have examined the effects of gardening programs on children's diet, and these have had mixed results.[12,21,23,24] Future research is needed to examine how gardening affects diet and physical activity, and ultimately obesity. Longitudinal study is needed to examine the persistence of these changes. Finally, given the high prevalence of hunger among families with children,[25] study of the effectiveness of gardening to prevent hunger and improve nutrition security is warranted.

Study findings point to several characteristics to incorporate in the design of gardening programs to improve nutrition and prevent obesity. (1) In Hawai'i, as in African-American and other minority communities,[26] large body size is seen as beautiful and desirable. Programs that present themselves as "obesity prevention" initiatives risk being rejected by the populations they seek to serve. Instead, messages about connecting with tradition, preventing hunger, or teaching life skills are more likely to be accepted. (2) Poverty is a barrier to good health, and impedes the ability of parents to provide their children the conditions necessary for health. Programs that provide nutrition education to children or parents must also address the economic and social conditions that facilitate or hinder making health-promoting choices.[27] (3) Teachers, administrators, and garden staff do not necessarily consider gardening programs as health-promoting programs. Health researchers and advocates need to educate child educators regarding the explicit connections between gardening and health.

Disclosure

The study was designed and data collected by Ameena T. Ahmed. All authors participated in data analysis and interpretation. The manuscript was drafted by Dr. Ahmed and revised by all authors. Dr. Ahmed vouches for the integrity of the data and analysis. The authors have no conflict of interest to disclose.

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Authors' Affiliations:
- Kaiser Permanente, Center for Health Research, Hawai'i, Honolulu, HI (A.T.A., C.E.O, R.N.)
- Kaiser Permanente, Division of Research, Oakland, CA (S.L.)
- University of Hawai'i, Honolulu, HI (R.N.)

Correspondence to:
Ameena T. Ahmed MD, MPH
501 Alakawa Street, Suite 201
Honolulu,HI 96817
Ph: (808) 432-5555
Fax: (808) 432-5121
Email: ameena.t.ahmed@kp.org

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Ea (Collective Life)

Poorer General Health Status in Children is Associated with being Overweight or Obese in Hawai'i: Findings from the 2007 National Survey of Children's Health

Kristen Teranishi MS; Donald K. Hayes MD, MPH; Louise K. Iwaishi MD;
and Loretta J. Fuddy ACSW, MPH

Abstract

Obesity is a widespread national issue that affects the health and well-being of millions of people; particular attention has been focused on the burden among children. The National Survey of Children's Health data from 2007 was used to examine the relationship of child health status and unhealthy weight (overweight/obese defined as body mass index in ≥85th percentile) among 874 children aged 10 to 17 years of age in Hawai'i. In particular, the parentally reported child's general health status was assessed comparing those with a poorer health status (defined as "good/fair/poor") to those with a better one (defined as "excellent/very good"). Descriptive analysis and multiple logistic regression analysis examined risk for overweight/obese with child's general health status, accounting for gender, race, and socioeconomic factors. More children with a poorer health status (46.5%; 95%CI=33.2-60.2) were overweight/obese compared to those of better health status (25.8%; 95%CI=21.9-30.2). Estimates of overweight/obese were high in Native Hawaiian/Pacific Islander (38.6%; 95%CI: 28.9-49.4), multiracial (30.9%; 95%CI=24.2-38.6) children, and children whose parents had less than 12 years education (56.8%; 95%CI=32.8-78.0). Multivariate logistic regression modeling showed a 2.92 (95%CI=1.52-5.61) greater odds for overweight/obese status in children with a poorer health status compared to those of better health status after accounting for age, race, gender, and parental education. Gender, race, and parental education were also significant factors associated with overweight/obese in the final adjusted model. It is important that children that are overweight or obese receive appropriate health screenings including assessments of general health status. Children in high risk socioeconomic groups should be a particular focus of prevention efforts to promote health equity and provide opportunities for children to reach their potential.

Introduction

Obesity affects the health and well-being of millions of people and is associated with chronic disease. Childhood obesity defined as having a body mass index (BMI) for age in the 95th percentile or higher, is of increasing concern as rates have tripled in the last forty years.[1] The prevalence of pediatric obesity is a growing problem in the US with estimates from a national population based survey showing an increase from 14.8% in 2003 to 16.4% in 2007.[2] Some of the known dangers and long term effects related to obesity in children include a higher risk for type 2 diabetes, cardiovascular problems, asthma, and cancer.[3] Childhood obesity may have other impacts on the development of children as well. For example, worsening perception of body weight is related to worse mental health outcomes among adolescents.[4] Children that are overweight or obese are more likely to have low self-esteem and be at risk for lower educational attainment and increased likelihood of depression compared to those that are not overweight or obese.[5-7] Identifying risk factors and associations with childhood obesity can help in the development of policies and programs to slow and reverse the growing burden.

General health status is a measure of how individuals perceive their health and has been associated with mortality for a variety of populations so it is commonly used in national surveys.[8] The general health status of children as perceived by parents may be a useful measure of the child's overall health and ability to function and has been included in both the 2003 and 2007 National Survey of Children's Health (NSCH).[9] Nationally in the 2007 NSCH, the parents of 84.4 percent of children under 18 years of age reported that their child's health was excellent or very good with some variation by child's race/ethnicity and the parents own general health status.[9] One study that looked at the same measure of general health status used in the NSCH identified the presence of multiple risk factors such as race, social class, health insurance coverage, and maternal mental health was associated with risk for developmental delay and a poorer general child health status.[10]

The relationship between a child's weight status and parental report of their child's general health status is unclear. A study of Australian primary school children showed that parents were more likely to report a poorer health and well-being for overweight and obese children compared to those that were of normal weight using a 50 item parent completed measurement.[11] That study defined general health as a "subjective assessment of overall health and illness, past, present and future," but did not provide any other details on the actual measurement.[11] There have been no studies that we located relating the parental report of their child's general health and weight status using the excellent-to-poor rating scale used in the NSCH. The aim of this analysis is to assess the relationship between child health status and overweight or obese status in Hawai'i using the 2007 NSCH data. A secondary purpose of this analysis is to highlight disparities in childhood overweight or obese status among race and socio-economic groups in Hawai'i using this survey data.

Methods

The National Survey of Children's Health (NSCH) is a population based parentally-reported telephone survey conducted in 2003 and 2007 by the Centers for Disease Control and Prevention's (CDC) State and Local Area Integrated Telephone Survey (SLAITS) program.[12] Almost 2,000 interviews were completed in each of the 50 states and the District of Columbia. Response rates averaged 46.7% nationally and was 42.2% in Hawai'i. Over 80 indicators of child health status were addressed by the NSCH. The responses are weighted to reflect estimates representative for each state's population. The publicly available 2007 dataset of 91,642 interviews includes de-identified information on respondents' children, of which 1,822 were from Hawai'i.

Weight status was based on BMI adjusted for age and gender. It was calculated from the parental reports of child's current height and weight and was only available for 874 children 10 to 17 years

of age (n=36 excluded in age group due to missing information on height or weight). BMI was classified into two categories for this analysis: (1) Overweight /Obese (85th percentile and above) and (2) Not Overweight/Obese (84th percentile and under).

Age was categorized in two four year age groups (10-13 years and 14-17 years) as the question used to calculate BMI was only available for children 10-17 years of age. Parent-reported racial categories for their children included Asian only, White only, Black only, Native Hawaiian/Pacific Islander (NH/PI) only, and multiracial (any combination of more than one race). Gender categories included boys and girls. Federal poverty level (FPL) tailored for Hawai'i was grouped as <100%, 100-199%, 200-399%, and ≥400%. Insurance types were public, private, and uninsured. Primary household language was categorized as English or non-English. Greatest level of education of any parent was grouped into <12 years, 12 years, or >12 years. Parent nativity was categorized as (1) at least one parent born in the United States, or (2) neither parent born in the United States.

Parents were asked to describe their child's general health based on a five-point Likert-type scale. Responses of "excellent" and "very good" were grouped together distinct from responses of "good," "fair," and "poor," which combined was used to reflect a poorer health status. This dichotomization of child's general health status was done due to the distribution of responses and to distinguish children who are reported by their parents to be in the lowest 3 response categories from the rest. For the remainder of this report these response categories will be referred to as "good/fair/poor" to reflect a poorer health status and "excellent/very good" to reflect a better health status.

Descriptive statistics including prevalence estimates and 95% confidence intervals (95%CI) were calculated. A multivariate logistic regression analysis assessed the relationship between childhood overweight/obese status and general child health status with several potential covariates. A model building strategy to find the most parsimonious model was used which resulted in the final model controlling for age, race, gender, and parental education. The relative standard error (RSE) was calculated by dividing the prevalence estimate by its standard error and expressed as a percentage. A standard threshold of RSE>30% was used for designating an estimate as inadequate for reliability and precision, and these estimates were suppressed in the tables. Sampling weights, which adjusted for factors such as non-response and demographics, were applied and used to reflect Hawai'i's population of non-institutionalized children under 18 years of age. SAS (version 9.2) and SUDAAN (version 10.0) statistical software was used for the analysis in order to account for the survey's complex sampling design. Significant testing was set at a probability of $p < 0.05$.

Results

Data showed that over one third of children in Hawai'i represented by this survey were multiracial, nearly a quarter were White only, about 1 in 5 were Asian only, and just under 1 in 5 were NH/PI children (Table 1). Most children lived above 200% FPL and received private health insurance. Most (94.5%) children lived in households where English was the primary language. Over three fourths of all children had at least one parent that received >12 years of education. About 25% of children did not have a parent born in the United States. Just over a quarter of children had a good/fair/poor general health status.

Data represented by this survey showed that statewide an estimated 28.5% of children were overweight/obese. Many NH/PI only (38.6%), multiracial (30.9%), and to a lesser extent White only (25.0%) children were overweight/obese compared to Asian only children (16.5%) (Table 1). More boys (32.5%) than girls (24.2%) were overweight/obese. A high proportion of overweight/obese children were living at <100%FPL (39.8%), were covered under public insurance (37.9%), and had parents whose highest education level was <12 years (56.8%). Nearly a half of children that were overweight/obese (46.5%) had a parental report of good/fair/poor health status compared to just a quarter of children that were not overweight/obese (25.8%).

Children in poorer overall health (good/fair/poor) were 2.49 times more likely to be overweight/obese compared to those in better (excellent/very good) health (Table 2). After adjustment for age, race, gender, and highest level of parent education, children in poorer overall health (good/fair/poor) were 2.92 times more likely to be overweight/obese compared to those in better (excellent/very good) health.

Compared to Asian only children, NH/PI only children were 3.04 times, and multiracial children were 2.31 times as likely to be overweight/obese in the adjusted model. Also, in the final model, boys were 1.94 times more likely than girls to be overweight/obese. Children whose parents' highest level of education was <12 years were 4.40 times more likely to be overweight/obese compared to children who had at least one parent with >12 years of education.

Discussion

This analysis demonstrated that a poorer child health status as reported by parents was associated with children being overweight or obese. The analysis also estimated that 28.5% of children 10-17 years of age in the sample for Hawai'i were overweight or obese. Further, some race and socioeconomic groups exceed this overall estimate for the state and represent key groups that specific interventions could decrease the burden of obesity in children. Obesity is complex and is influenced by genetic and hormonal factors that affect the regulation of appetite and energy balance, environmental factors, neurological factors, and socioeconomic factors.[13] Childhood obesity increases risk for diabetes, cardiovascular illness including heart disease and hypertension, and respiratory complications such as asthma, ultimately affecting quality of life.[13,14] The impact of obesity has been at the forefront of national concern because of its affect on health and its sizable contribution to rising medical spending.[15]

In the analysis a poorer overall health status was associated with a child being overweight/obese. A child who is not physically or emotionally well, for instance, may have difficulties in leading an active lifestyle and therefore may be at higher risk of being overweight/obese. The adjusted analysis presented here indicated an almost three times higher risk of being overweight/obese in children who were in poorer (good/fair/poor) general health compared to those in better (excellent/very good) general health. The relationship between overall health status as a whole and childhood obesity at the national level has not been well characterized in the literature, and this study is meant to add to the body of literature. A national study, however, involving an adjusted analysis in an adult population showed that obese adults were 1.42 times more likely to have worse quality of life including general health status.[16] The analysis would be in agreement by showing that children with a poorer general health

Table 1. Population and Overweight/Obese Prevalence Estimates by Selected Characteristics among Children 10-17 Years of age in Hawai'i, 2007 NSCH

		Population Prevalence		Overweight/Obese Prevalence	
	N	(%)	95% CI	(%)	95% CI
Age					
10-13 years	416	52.0	(47.6-56.3)	31.8	(26.1-38.1)
14-17 years	458	48.0	(43.7-52.4)	24.9	(20.0-30.6)
Race					
Asian Only	222	20.2	(17.3-23.5)	16.5	(11.5-22.9)
White Only	181	24.3	(20.6-28.4)	25.0	(17.7-34.2)
Black Only	N/A	N/A	N/A	N/A	N/A
NH/PI Only*	159	18.6	(15.4-22.3)	38.6	(28.9-49.4)
Multiracial	260	34.1	(29.9-38.5)	30.9	(24.2-38.6)
Gender					
Boys	440	51.8	(47.5-56.1)	32.5	(27.0-38.5)
Girls	434	48.2	(43.9-52.6)	24.2	(19.0-30.4)
Federal Poverty Level					
<100%	71	13.0	(9.7-17.1)	39.8	(25.8-55.7)
100-199%	160	21.4	(17.8-25.4)	34.3	(25.3-44.6)
200-399%	342	36.7	(32.8-40.9)	25.7	(20.3-31.9)
400%+	301	29.0	(25.4-32.8)	22.6	(17.1-29.3)
Insurance Type					
Public	130	17.6	(14.2-21.7)	37.9	(27.3-49.8)
Private	691	78.0	(73.9-81.7)	26.5	(22.3-31.2)
Uninsured	39	4.3	(3.0-6.2)	18.9	(8.7-36.2)
Primary Language					
English	829	95.4	(93.1-96.9)	28.3	(24.4-32.6)
Non-English	45	4.6	(3.1-6.9)	31.4	(13.5-57.5)
Parent Education					
<12 Years	23	1.7	(1.0-2.8)	56.8	(32.8-78.0)
12 Years	114	19.9	(16.1-24.2)	34.4	(23.9-46.7)
>12 Years	693	78.5	(74.2-82.3)	25.5	(21.6-29.9)
Parent Nativity (Born in United States)					
At Least One Parent	621	74.1	(70.1-77.8)	28.8	(24.6-33.4)
Neither Parent	211	25.9	(22.2-29.9)	20.1	(12.4-30.8)
Overall Health					
Good/Fair/Poor	230	28.5	(24.6-32.7)	46.5	(33.2-60.2)
Excellent/Very Good	644	71.5	(62.3-75.4)	25.8	(21.9-30.2)
Total	874	100.0		28.5	(24.6-32.7)

*NH/PI=Native Hawaiian/Pacific Islander. N/A=Estimate suppressed as it does not meet standards for reliability and precision; Relative Standard Error>30%.

status are at increased risk to also be overweight or obese. There has been little published related to the validity of proxy reported general health status for children that is central to this analysis and national morbidity surveys of children, but one study we located found variation in parental reporting of child health status among three subspecialty clinics.[17] They showed the strongest association existed among those with children with a chronic disease (pediatric rheumatology center) who had previously been healthy compared to those with a disability following a neonatal event (neonatal follow up program, and Spina Bifida program).[17] The analysis included children with special health care needs, but sample size limitations did not allow us to evaluate this specific group by weight status.

In the analysis, childhood overweight/obese in this survey population in Hawai'i was estimated to be 28.5% which falls below the national average of 31.6% for children 10 to 17 years of age.[2] A limitation of the representativeness of the estimates from this survey are due to the low response rate of 42% for Hawai'i and the reliance of the survey on only sampling homes with land-based telephones. A greater proportion of households are relying only on cellular phone technology with an estimated 17.5% of households in 2008

Table 2. Association Between Overweight/Obese Children and General Child Health Status among children 10-17 years of age in Hawai'i, 2007 NSCH

	Crude Odds Ratio		Adjusted Odds Ratio	
	Odds Ratio	**95% CI**	**Odds Ratio**	**95% CI**
General Child Health Status				
Good/Fair/Poor	2.49	(1.37-4.52)	2.92	(1.52-5.61)
Excellent/Very Good	1.00	Referent	1.00	Referent
Age				
10-13 years	1.00	Referent	1.00	Referent
14-17 years	0.71	(0.48-1.06)	0.73	(0.47-1.13)
Race				
Asian Only	1.00	Referent	1.00	Referent
White Only	1.69	(0.93-3.10)	1.84	(0.97-3.52)
Black Only	N/A	N/A	N/A	N/A
NH/PI Only*	3.19	(1.75-5.83)	3.04	(1.57-5.89)
Multiracial	2.27	(1.33-3.87)	2.31	(1.34-3.99)
Gender				
Boys	1.50	(1.00-2.26)	1.94	(1.25-3.02)
Girls	1.00	Referent	1.00	Referent
Parent Education				
<12 Years	3.84	(1.39-10.63)	4.40	(1.49-12.97)
12 Years	1.53	(0.88-2.67)	1.21	(0.67-2.18)
>12 Years	1.00	Referent	1.00	Referent

*NH/PI=Native Hawaiian/Pacific Islander. N/A=Estimate suppressed as it does not meet standards for reliability and precision; Relative Standard Error>30%.

living in wireless only homes with the rate expected to continue to increase.[25] There are substantial demographic differences with those that are younger, those living in poverty, those renting, and men more likely to be in these wireless only homes,[25] so the estimates shown in the NSCH data is not representative of all children living in Hawai'i, particularly among those of lower socioeconomic status. However, it is important to share the findings related to many of these indicators with this limitation in mind. The analysis showed some disparities in children that were overweight/obese among those with a poorer health status, boys, racial minority groups, and children whose parents have limited education, indicating that these factors have a unique contribution to the risk for overweight/obese even after accounting for differences among these factors. Many of these types of disparities seen in Hawai'i have also been reported nationally, especially in relation to gender, race, and insurance type using the same data set,[2] and will be briefly discussed.

The analysis showed that NH/PI and multiracial children in Hawai'i are at higher risk for being overweight/obese. The risk remained significant after adjusting for age, gender, parental education, and overall health status. Further delineation to look at individual Native Hawaiian or Other Pacific Islander groups, or common categories of multiracial children was not possible from the NSCH data set. Hawai'i has an ethnically diverse population with approximately a third of mothers and nearly a third of fathers that have had a child in Hawai'i and are themselves multiracial.[18] Consequently, a higher percentage of births and children would be expected to be multiracial in Hawai'i than shown in the data represented in the 2007 NSCH, and highlights an important limitation about the collection of race information as well as the representativeness of this data. In analysis of data from Hawai'i, it is preferable to differentiate Native Hawaiian from other Pacific Islanders, and to better clarify the large multiracial population present in the state. These refinements were not possible due to limitations in the NSCH dataset. Consequently, it is hard to determine the usefulness of the federal race groups as reported in the data set to population interventions in Hawai'i.

Gender may be related to overweight/obese due to many factors including differences in fat composition and distribution, physical activity, diet type, and impact of family environment.[19] For instance, one study of 3,421 children showed overweight prevalence higher in boys (29.1%) than girls (27.9%), with boys tending towards eating fatty foods compared to girls with less engagement in physical activity.[20] National data showed boys as 1.42 times (adjusted) more likely to be overweight/obese compared to girls using the same population based data set that we used in the analysis.[2] The adjusted analysis using Hawai'i data showed an even stronger relationship with boys being 1.94 times more likely to be overweight/obese compared to girls after accounting for child health status, age, race, parental education.

Socioeconomic status including income level and education tends to show association with obesity although many studies focus on the adult obese population.[13] However, reporting of income is often under-reported and confounded by large amounts of unknown or missing data. For comparisons to national data, the analysis focused on parental education to reflect socio-economic status.[21, 22] Limited parent education may be related to children being overweight/obese but may depend on other social determinants of health such as the particular community in which a child lives, household income, or where a mother was born.[23] The adjusted analysis showed that level

of parental education remained significant after adjustment for child health status, age, gender, and race.

The present analysis and data has several limitations, some of which have already been described. The NSCH uses data from parental self-report, which may be subject to validity and bias issues. For instance self-report by adolescents of height and weight in the context of overweight/obese can generate biased responses in the calculation of weight status.[24] In fact the NSCH 2007 data suppressed BMI for children under 10 years old because they found that parental report for those under 10 years of age significantly underestimated height in pre-school and elementary school students.[12] Secondly, the methodology used for the 2007 NSCH is based on the response of those homes with a land-based telephone line so the estimates of overeweight/obesity are likely to be under estimated in this data. Thirdly, some population groups were relatively small (e.g., Black only, uninsured, non-English speaking, county of residence) so limited interpretation could be made based on estimates in these groups. Lastly, this study was cross sectional and did not allow an assessment of the relationship between parentally reported general child health status and overweight/obese weight status over time.

The causes of childhood obesity are complex and some potential areas that have been suggested to reduce this burden include lifestyle modifications such as increasing physical inactivity, decreasing availability and intake of fast foods, decreasing viewing of television, decreasing use of video games, and decreasing internet usage.[26] The analysis identified that a poorer child health status reported by the parent was associated with the child being overweight/obese using cross sectional data and may represent another potential factor to focus on to improve the health status of children. Efforts to understand the role of parentally reported child health status and its temporal relationships to the overall treatment and prevention of childhood obesity are needed before specific recommendations can be made. It will be important to ensure that children that are overweight or obese receive appropriate health screenings including an assessment of general health status to address potential co-morbidities. Children in high risk socioeconomic groups should be a particular focus of prevention efforts to promote health equity and provide opportunities for children to reach their potential.

Conflicts of Interest: None

Disclosure Statement

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Authors' Affiliations:
- Family Health Services Division, Hawai'i State Department of Health, Honolulu, HI (K.T., D.K.H., L.K.I., L.J.F.)
- John A. Burns School of Medicine, University of Hawai'i, Honolulu, HI (K.T., D.K.H., L.K.I.)

Correspondence to:
Donald Hayes MD, MPH
Family Health Services Division
Hawai'i Department of Health
3652 Kilauea Ave
Honolulu, HI 96816
Ph: (808) 733-8360
Fax: (808) 733-8369
Email: Don.hayes@doh.hawaii.gov

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Hawai'i's Opportunity for Active Living Advancement (HO'ĀLA): Addressing Childhood Obesity through Safe Routes to School

Katie M. Heinrich PhD; Laura Dierenfield BA; Daniel A. Alexander BA; Marcia Prose BS; and Ann C. Peterson MS

Abstract

*Increasing active transportation to and from school may reduce childhood obesity rates in Hawai'i. A community partnership was formed to address this issue in Hawai'i's Opportunity for Active Living Advancement (**HO'ĀLA**), a quasi-experimental study of active transportation in Hawai'i County. The purpose of this study was to determine baseline rates for active transportation rates to and from school and to track changes related to macro-level (statewide) policy, locally-based Safe Routes to School (SRTS) programs and bicycle and pedestrian planning initiatives expected to improve the safety, comfort and ease of walking and bicycling to and from school. Measures included parent surveys, student travel tallies, traffic counts and safety observations. Assessments of the walking and biking environment around each school were made using the Pedestrian Environment Data Scan. Complete Streets and SRTS policy implementation was tracked through the activities of a state transportation-led Task Force and an advocacy-led coalition, respectively. Planning initiatives were tracked through citizen-based advisory committees. Thirteen volunteer schools participated as the intervention (n=8) or comparison (n=5) schools. The majority of students were Asian, Native Hawaiian, and Pacific Islander in schools located in under-resourced communities. Overall, few children walked or biked to school. The majority of children were driven to and from school by their parents. With the influence of **HO'ĀLA** staff members, two intervention schools were obligated SRTS project funding from the state, schools were identified as key areas in the pedestrian master plan, and one intervention school was slated for a bike plan priority project. As the SRTS programs are implemented in the next phase of the project, post-test data will be collected to ascertain if changes in active transportation rates occur.*

Introduction

Active travel modes to and from school contribute significantly to physical activity rates as well as lower obesity rates among school children.[1-3] Conversely, children taking motorized transportation to and from school have shown a two to three pound per year weight gain.[4] Over time – in accordance with rising obesity rates (especially for children in low-income households[5]) – the percentage of United States youth walking or bicycling to school has drastically declined.[6] Among the many reasons for this shift are a lack of safe facilities and a perceived lack of safety among parents.[7,8] In response, communities across the United States have adopted Safe Routes to School (SRTS) programs which take a comprehensive approach to improving bicycling and walking to school.[9]

Another emerging trend in transportation policy reform is Complete Streets (CS) policies. These policies require roads to accommodate all users. It is often pointed out that CS policies can augment SRTS programming. And, research shows up to a three-fold increase in active transportation to school among children after the addition or improvement of bicycle lanes, traffic signals, crosswalks and sidewalks.[10] What is not clear is whether statewide CS and SRTS policies help to increase physical activity rates and decrease obesity rates among children by requiring (via CS policy) and accelerating (via SRTS policy) both the necessary engineering improvements and the equally important education, encouragement and enforcement steps to get more children walking and bicycling to school.

To address this question of macro-level policy influence on childhood obesity, this study capitalized on two recently passed statewide policies for CS (Act 54[11]) and SRTS (Act 100[12]) as well as accompanying bicycle and pedestrian planning initiatives and new SRTS programs expected to have impacts over the next 3-5 years on the built environment around school zones. The study was coordinated by an advocacy-academic partnership between Peoples Advocacy for Trails Hawai'i (PATH) and the University of Hawai'i at Manoa, with strong support from the County of Hawai'i. The purpose of this manuscript is to describe the progress to date and baseline results for the first 6 months of the project.

Methods

Participants

Hawai'i's Opportunity for Active Living Advancement (HO'ĀLA) was funded for a 12-month period by the Robert Wood Johnson Foundation through the Active Living Research Program. In this quasi-experimental study we recruited 13 schools on the island of Hawai'i (33% of all schools on the island) to participate as either an intervention school (receiving SRTS assessments and SRTS programming) or comparison school (receiving only the SRTS assessments). Schools in under-resourced communities were targeted using several steps. Initially, all eligible schools were sent a postcard notifying them of the study. Eligibility criteria included: (1) having ≥35% of students who qualified for free and reduced school lunch; (2) were willing to fulfill study requirements; and (3) were rural (<20% of student lived within 1-mile) or neighborhood (>60% of students lived within 1-mile). Next, the schools were emailed and mailed informational packets explaining study details and offering $1000 mini-grants to those that would like to participate as intervention schools (comparison schools received the assessments for free). A second follow-up e-mail was sent and interested schools responded by e-mail. Finally, phone calls were made to interested schools to set up an in-person meeting to finalize the recruitment process. School administrators chose whether their school would be an intervention (n=8) or comparison (n=5) school.

Measures

Standardized measures developed by the National Center for SRTS were used to assess travel modes to and from school for both students and parents (http://www.saferoutesinfo.org/resources/index.cfm). The Parent Survey about Walking and Biking to School was distributed to all students to take home to their parents. The parent survey was estimated to take 5-10 minutes and gathered information about factors that affected whether or not parents would let their children walk or bike to school. Parents indicated their child's grade and gender and the total number of children they had in grades K-8. They were asked to indicate how far their child lived from school

and how "on most days" their child arrived and departed from school (i.e., walking, biking, school bus, family vehicle, carpool, transit, or other). In addition, parents were asked to indicate how long it normally took their child to get to and from school, if their child had asked for permission to walk or bike to or from school, and their opinions on issues affecting their decision to allow their child to walk or bike to or from school. Finally, parents indicated their own level of education and could provide additional comments.

The Student Travel Tally was used to assess how children traveled to and from school. Teachers in first and fourth grade classrooms at each school were asked to conduct the travel tally with their class. Students were asked "How did you arrive at school today?" and "How do you plan to leave for home after school?" Students then raised their hands to indicate the travel mode (identical to the parent survey categories) the used for each trip. Weather conditions, class size, and the number of students present at the time of the tally were recorded.

Traffic Counts and Safety Observations were taken using methodology from the PATH Hawai'i SRTS Toolkit.[13] Trained observers were stationed at standardized locations around each school during the 1 1/2 hours before school began and after school ended. For the traffic counts, observers indicated the number of people that passed through their observation zone using one of the following transportation modes: car, public transportation, bike with a helmet, bike without a helmet, pedestrian and other (e.g., skateboard). For the safety observations, observers counted the occurrence of seven safety hazards (e.g., number of motorists failing to yield to pedestrians, number of cars speeding, jaywalking).

The Pedestrian Environment Data Scan (PEDS)[14] was used to track the physical conditions of all street segments that comprised the main travel routes within 1/2 mile of each school. The PEDS provided a comprehensive, objective assessment of the built environment for walkability and bikeability. This one-page paper instrument consisted of four major sections: a) environment, b) pedestrian facilities, c) road attributes, and d) walking/cycling environment. Raters indicated the absence or presence of each item and counted items as appropriate. In addition, raters were asked to subjectively rate the attractiveness and safety of the segment for both walking and cycling on a 3-point scale from 1=strongly agree to 4=strongly disagree. Individual items of the PEDS have shown high inter-rater reliability, with 89% of items having 80% agreement or higher.[14]

The SRTS programmatic components that were tracked at each school included the formation of a SRTS team; completion of a SRTS action plan; completion of various educational, encouragement, or enforcement strategies as identified in the action plan; technical assistance provided for additional funding; and SRTS funding awards.

HO'ĀLA project staff members attended and participated in all relevant planning or task force meetings to track the progress on the two policies and the bicycle and pedestrian initiatives. In addition, we took notes and saved copies of relevant documents.

Procedures

All study procedures were approved by the University of Hawai'i Institutional Review Board. Data collectors were trained on the use of each data collection instrument, including a five-hour training session specifically for the PEDS instrument. Teams of data collectors were dispersed on "assessment days" at each school.

The initial year of the project was focused on assessing existing active transportation behaviors and physical infrastructure around Hawai'i County schools while monitoring the first efforts to implement macro-level policies and plans as well as locally-based SRTS programs. All schools agreed to fulfill study requirements and both comparison and intervention schools received baseline SRTS reports about street segment conditions and how students traveled to and from school. Each intervention school agreed to host a SRTS workshop. Intervention schools then began PATH's "Three-Steps to Success" SRTS implementation model, resulting in the development of their own custom SRTS plan. Besides the $1,000 mini-grants, intervention schools received technical assistance from PATH to aid in the planning and implementation of their SRTS programs. Schools will now be implementing their SRTS programs and follow-up assessments are scheduled to determine the impact of the intervention.

All school data were analyzed with PASW Statistics 18 (Chicago, IL). Summary statistics were created to provide baseline characteristics for each school. Comparisons were made to determine if statistically significant differences existed at baseline between intervention and comparison schools. Progress on the policies and planning initiatives were summarized qualitatively.

Results

As shown in Table 1, five schools were in neighborhoods and eight were in rural settings. Enrollment ranged from 128 to 850 students. Asians, Native Hawaiians, and Pacific Islanders made up the ethnic majority for all but one of the schools. Percentages of free and reduced school lunches ranged from 35.9% to 93.5%. Baseline data were available from 8 intervention and 4 comparison schools.

Parent Surveys

Survey response rates ranged from 13.1% to 58.4% per school with 1191 surveys completed at intervention and 457 surveys completed at comparison schools. Although parents of children from all grades were asked to complete a survey, about one-third of the responses were from parents of 1st and 4th graders (students targeted by the intervention). Children's genders were almost equally represented and most parents had 2 children in grades K-8. See Table 2.

Statistically significant differences existed between intervention and comparison schools for household distance from school, $\chi^2=121.1$, $p<.001$, with comparison school parents tending to live closer to school. Almost half of the intervention (49.5%) but only 34.1% of the comparison school parents reported living more than 2 miles from school. In contrast, 25.4% of comparison and only 8.1% of intervention school parents reported living within 1/4 mile of the school. Table 3 displays the households' distances from school, modes of arrival, and modes of departure from school.

Statistically significant differences were also found between intervention and comparison schools for how children arrived at school ($\chi^2=72.7$, $p<.001$) and how they departed school ($\chi^2=84.8$, $p<.001$). As shown in Table 3, the main difference was that children at intervention schools were more likely to ride the bus to and from school if they were not driven to school by their parents.

Table 1. School Characteristics					
School #	**Enrollment**	**Intervention or Comparison**	**Neighborhood or Rural**	**% Asian, Native Hawaiian, Pacific Islander**	**% Free and Reduced School Lunch**
1	128	C	R	56.3	93.5
2	551	I	N	50.6	49.8
3	157	C	R	89.3	59.6
4	630	I	R	66.8	82.6
5	273	I	R	64.0	50.4
6	686	I	N	40.1	37.3
7	640	I	R	70.7	51.9
8	500	I	N	51.1	35.9
9	383	C	N	55.9	68.3
10	850	I	N	68.7	51.0
11	331	C	N	90.6	82.0
12	141	C	N	72.3	66.0
13	245	I	N	70.3	52.7

Table 2. Parent Survey Demographics		
Characteristic	**Intervention n (%)**	**Comparison n (%)**
Grade of Child		
1st	229 (19.0)	71 (15.7)
4th	196 (16.5)	67 (14.7)
Gender of Child		
Female	491 (50.9)	212 (51.2)
Male	474 (49.1)	202 (48.8)
Average Number of Children in grades K-8 in Household	mean = 1.72, sd = 0.88	mean = 1.92, sd = 1.00
Parent had graduated college	298 (25.0)*	63 (13.8)
Total Number of Surveys	**1191**	**457**

*p<.001

Only 16% of students from intervention schools had asked their parents if they could walk or bike to school, while 34.1% of students from comparison schools had done so. However, the majority of parents at both school types (67.8% at intervention and 54.9% at comparison schools) reported that they would never let their child walk or bike to or from school without adult supervision.

The top six factors influencing parents' decisions whether to let their children walk or bike to school included distance, speed of traffic, amount of traffic, safety of intersections and crossings, weather or climate, and the conditions of sidewalks or pathways. As shown in Table 4, significantly more parents at intervention schools, as compared to comparison schools, reported these factors (except weather or climate).

The top six factors that, if they would improve, parents would be more likely to let their child walk or bike to school included the condition of sidewalks or pathways, safety of intersections and crossings, crossing guards, speed of traffic, amount of traffic, and adults to walk or bike with. As shown in Table 5 parents from comparison schools were more likely to report that they would let their child walk or bike if each factor improved.

Student Travel Tally

Student travel tallies were completed in 40 classrooms at six intervention schools and 13 classrooms at five comparison schools. The average class enrollment was slightly higher at intervention schools (mean=22.65, sd=4.74 students) than at comparison schools (mean=18.62, sd=2.10 students). Rates of walking were comparable between intervention and comparison schools, averaging 2 or fewer students per classroom, as were rates of bicycling, averaging 1 or fewer students per classroom. In agreement with the parent surveys, more students from intervention schools reported riding the bus, averaging 4.6 students per classroom, as compared to 2.4 students per classroom at comparison schools. The majority of students reported riding in their family vehicle; averaging 14.8 students per classroom at intervention and 12.8 at comparison schools.

Pedestrian Environment

Using the PEDS, a total of 242 segments were assessed at intervention and 129 segments were assessed at comparison schools. As shown in Table 6, similarities were found for the frequency of intersections, pedestrian facilities, paved trails and sidewalks,

Table 3. Distance, Mode of Arrival, and Mode of Departure from School		
Variable	Intervention n (%)	Comparison n (%)
Household distance from school		
< 1/4 mile	96 (8.1)	116 (25.4)
1/4 to 1/2 mile	75 (6.3)	53 (11.6)
1/2 to 1 mile	158 (13.3)	52 (11.4)
1-2 miles	199 (16.7)	42 (9.2)
> 2 miles	590 (49.5)	156 (34.1)
How Child Arrives at School		
Walk	41 (7.4)	34 (7.4)
Bike	3 (0.3)	2 (0.4)
School bus	273 (22.9)	30 (6.6)
Family vehicle	814 (68.3)	353 (77.2)
Carpool	33 (2.8)	10 (2.2)
Transit		
Other	0	1 (0.2), 2 (0.4)
How Child Departs School		
Walk	56 (4.7)	50 (10.9)
Bike	3 (0.3)	2 (0.4)
School bus	295 (24.8)	33 (7.2)
Family vehicle	708 (59.4)	308 (67.4)
Carpool	22 (1.8)	9 (2.0)
Transit	17 (1.4)	1 (0.2)
Other	1 (0.1)	3 (0.7)

Table 4. Percentage of parents whose decisions to allow child to walk/bike were affected by each factor		
Factor	**Intervention Schools**	**Comparison Schools**
Distance	68.0**	56.2
Speed of traffic along route	67.6**	51.2
Amount of traffic along route	65.2**	49.9
Safety of intersections/crossings	59.6**	50.3
Weather/climate	56.9	52.5
Sidewalks or Pathways	54.4**	40.7
Violence/crime	45.3	41.6
Time	39.0	35.4
Crossing Guards	32.9	32.2
Child's before/after school activities	27.6	27.6
Adults to walk or bike with	24.3	23.9
Convenience of Driving	23.4	29.3*

*p<.05, **p<.001

Table 5. Percentage of parents who would let child walk/bike if the factor improved		
Factor	**Intervention Schools**	**Comparison Schools**
Sidewalks or Pathways	36.4	38.6
Safety of intersections/crossings	34.2	38.5
Crossing Guards	32.9	35.6*
Speed of traffic along route	29.1	34.1
Amount of traffic along route	28.9	33.7
Adults to walk or bike with	28.2	36.1*
Weather/climate	23.2	31.7*
Distance	22.9	29.4**
Violence/crime	22.4	25.4**
Time	20.3	29.3*
Child's before/after school activities	13.6	29.0***
Convenience of Driving	13.1	23.8**

*p<.05, **p<.01, ***p<.001

walkway obstructions, road conditions, and a modal speed limit of 25mph, as well as for the lack of crosswalks, bicycle facilities, or amenities. Main differences consisted of more intervention school street segments having a slight hill (44.2%) and more comparison school street segments being flat (57.4%); fewer intervention school street segments had pathways in good condition, complete walkways within the segment, traffic control devices, or crossing aids. However, intervention school street segments were more likely to have buffers and speed limits ranging up to 55mph.

Traffic counts confirmed the data reported from the parent surveys and student travel tallies. For the trip *to* school, cars comprised the majority of the traffic counts (82.1%, n = 3,641) up to 485 per school (total = 3,641). Buses comprised 1.7% of the total counts (n = 76), transporting multiple children on each bus. Slightly more pedestrians were counted than indicated by parent and student data (14.7%, n = 651). Few bicyclists were counted (0.8%, n = 37), although one intervention school had 15. Up to 9 other forms of transportation were counted per school (0.7%, n = 30). For the trip *from* school, travel modes were similar: 75.2% of children were transported in cars (n = 2478), 2.2% in buses (n = 73), 20.9% were pedestrians (n = 689), 0.7% were bicyclists (n = 24), and 0.9% used other forms of transportation (n = 31). The main problems reported during safety observations included cars not yielding to crossing pedestrians and speeding cars.

SRTS Progress at Intervention Schools

Each school received a baseline report, summarizing the SRTS and PEDS assessments. Reports were then disseminated to the greater community through an interactive Town Hall process. Schools formed SRTS teams and worked with those teams to develop SRTS Action Plans that identified key strategies that the school and community agreed upon. Schools have begun to implement their SRTS programs and follow up assessments were scheduled.

Policy Tracking

The Executive Director of PATH served on the Statewide Complete Streets Task Force, with the final policy document finalized on September 15, 2010. Next, the State of Hawai'i and the counties will develop their policies using the model guidance created by the task force. In addition, PATH led a statewide coalition of over 30 organizations focused on implementation of the SRTS law passed in 2009, resulting in an obligation of $1.2 million for SRTS projects. An additional $700,000 was anticipated to be obligated by 2011.

Table 6. Street Segment Characteristics		
Item	**Intervention (242)**	**Comparison (129)**
Grade of hill	44.2% had slight hill (n=107)	57.4% were flat (n = 74)
Intersections	83.5% had an intersection (n=202)	88.4% had an intersection (n=114)
Pedestrian facilities	64.5% yes (n=156)	66.7% yes (n=86)
Paved trail/sidewalk	Yes 61.6% (98/159)	Yes 68.2% (58/85)
Path condition	46.1% good (70/152)	63.5% good (54/85)
Walkway obstructions	42.4% of segments with a walkway (n=67/158)	41.2% of segments with a walkway (n=35/85)
Buffers	30.3% (47/155)	20.9% (18/86)
Is walkway complete?	58.7% yes (54/92)	78.8% (41/52)
Condition of road	75.3% good (177/235)	72.1% good (93/128)
Speed limit	Range 10-55, mode 25mph	Range 10-35, mode 25mph
Any traffic control devices	39.4% yes (93/236)	57.4% yes (74/129)
Any crossing aids	17% yes (40/235)	25.6% yes (33/129)
Crosswalks	66.5% had none	62.8% had none
Bicycle facilities	Only for 10 segments 4.1%	Only for 6 segments 4.7%
Any amenities in segment	Only for 7 segments 2.9%	Only for 5 segments 3.9%

This represented the first obligation of SRTS funds in the state. Of these funds, approximately $600,000 should be awarded to two of the intervention schools in the HO'ĀLA project.

Planning Initiatives

HO'ĀLA study staff members participated in all of the transportation planning initiatives underway in the state and ensured that SRTS solutions were considered in projects, with special attention paid to projects that would impact intervention schools. PATH was selected to serve on the 20 member statewide Pedestrian Master Plan Citizens Advisory Committee. This resulted in an emphasis on schools as a key area of concern in the plan. In addition, PATH was successful in identifying four high priority projects in the existing Bike Plan, one of which would directly impact an intervention school. PATH also hosted a Pedestrian Safety Action Plan Workshop that created a Pedestrian Plan for Hawai'i County through the Strategic Highway Safety Plan Bicycle and Pedestrian Emphasis Area. The Workshop focused on SRTS as a key area of concern for Hawai'i County and developed strategies for enhancing and maintaining pedestrian safety through SRTS.

Discussion

In the first six months of the HO'ĀLA project, thirteen schools were recruited to participate and baseline observations were completed at twelve. Similar to other states, few students walked or biked to school in this ethnically diverse population in Hawai'i.[6] In almost all schools, the majority of children were driven to and from school by their parents. Real safety concerns, including missing infrastructure, existed around each school that were both noted by parents and by observers.[7,8] Although most parents said they would never let their child walk or bicycle to school, others indicated that if specific problems were addressed, they would be more likely to do so.

Project successes to date included the number of schools that signed up to participate (one in three schools on the island of Hawai'i). Another area of success was the ability to help influence the Complete Streets policy language to specifically point toward the need to accommodate children in the planning and design of roadways. In addition, through the influence of HO'ĀLA project staff, schools were included as one of the primary criteria in the methodology for determining project priorities in the Statewide Pedestrian Plan. Another area of success was in the collaboration between the University of Hawai'i at Manoa and PATH, working together to accomplish rigorous evaluation with meaningful impact on the school communities.

Primary project challenges were in the formation of SRTS teams at some of the intervention schools. The rapid nature of the project did not allow for a lot of time to develop strong teams and this resulted in some lack of initiative and leadership in a few schools. This challenge was overcome by working closely with the schools to help them find ways to incorporate the SRTS effort into existing groups such as the Parent-Teacher Organization. Another challenge included the discontinuation of the Balanced Transportation Coordinator position in the Hawai'i County Planning Department which led to a change in our initial project team structure. This was overcome by working closely with the Hawai'i County Public Works Department and the Data Systems Department. In the end, these two challenges strengthened the project considerably, by allowing for closer management and guidance of the schools.

As SRTS programs are implemented in the next phase of this project, it is important to address traffic problems and missing infrastructure in order to increase walking and biking to school by low-income, Asian/Native Hawaiian/Pacific Islander children in Hawai'i County. Project collaborations will help utilize these results to move forward necessary changes in programming, policies, and the physical environment.

Disclosures

This study was conducted while KMH was at the University of Hawai'i at Manoa. The study was designed by KMH and LD. Data were gathered by LD, MP, and ACP. Data were entered and cleaned by DA and analyzed by KMH and DA. This manuscript was primarily written by KMH and LD with some assistance by DA. The authors have no financial relationships or conflicts of interest to disclose for this manuscript.

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Authors' Affiliation:
- Department of Kinesiology, Kansas State University, Manhattan, KS (K.M.H.)
- Peoples Advocacy for Trails Hawai'i, Kailua-Kona, HI (L.D., M.P., A.C.P.)
- Department of Urban and Regional Planning, University of Hawai'i, Honolulu, HI (D.A.A.)

Correspondence to:
Katie M. Heinrich PhD; Department of Kinesiology, Kansas State University,
1A Natatorium, Manhattan, KS 66506; Ph: (785) 532-7771; Fax: (785) 532-6486;
E-mail: KMHPhD@ksu.edu

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Lōkahi (Holistic, Interconnected)

The Prevalence of Overweight and Obesity in Children at a Health Maintenance Organization in Hawai'i

MariaIliana J. Stark DrPH, APRN-Rx, PNP-BC; Victoria P. Niederhauser DrPH, APRN-BC, PNP; Janet M. Camacho MSN, MPH, APRN, PNP-BC; and Lance Shirai MD

Abstract

In the past 20-30 years, the number of overweight children in the United States has doubled.[1] Overweight children are acquiring conditions such as hypertension, type II diabetes, hypercholesterolemia, sleep apnea, and orthopedic problems. The purpose of this study was to explore the prevalence of and factors associated with at risk and overweight in children 2-10 years of age in a Health Maintenance Organization (HMO) in Hawai'i. This quantitative, retrospective cross-sectional study included a stratified random sample of 554 children ages 2-10 years who received a well child health care exam at a HMO in 2003. The prevalence of at risk and overweight were examined including the relationship between ethnicity, socioeconomic status, place of residence, and a child being overweight. Thirteen percent were at risk for overweight (BMI 85-95%) and 19% (BMI >95%) were overweight. In the 6-10 year age group, 42 % were overweight or at risk for being overweight. Boys had a higher incidence of being overweight (54%) than the girls (46%). Pacific Islanders had the highest incidence of overweight (40%), followed by the Hawaiian/Part Hawaiians (19%) and Filipinos (19%). Ethnicity and place of residence were significantly associated with being at risk or overweight. Pacific Islanders were 4 times more likely to be overweight/at risk for overweight and those residing in the West O'ahu, Honolulu, and Central O'ahu/North Shore areas were 2-3 times more likely to be at risk for overweight when compared to children living in the Windward side. With increased age, the prevalence of overweight increased. Findings suggest that targeted obesity prevention strategies need to be initiated early in life and geared for ethnically and geographically diverse children and their families.

Introduction

Obesity is a major public health concern in pediatrics, both nationally and in Hawai'i. Identifying overweight children is a priority of the United States Department of Health and Human Services. Monitoring the prevalence of overweight children is one of the ten leading health indicators in Healthy People 2010.[2] Overweight in children has been associated with both physical and psychological risk factors such as hypertension, dyslipidemia, hyperinsulinemia, orthopedic problems, social rejection, and low self-esteem.[2-6] The onset of these obesity-related morbidities in childhood predicts the presence of disease in adulthood. One out of six overweight children 6 years of age and older has been noted to have one or more heart disease risk factors.[2]

The prevalence of obesity in children and adolescents in the United States has been difficult to estimate because of a lack of consensus in the definition of obesity and lack of studies that focus on the pediatric population. Data on childhood obesity and different ethnic groups is minimal. More than one in seven children were overweight in the United States in 1999-2000; this is triple the 1960's rates.[7] From 1999-2004, all ethnic/racial, gender, and age groups have increased in the percentage of children who are considered overweight.[8]

Nineteen percent of children ages 6-11 years and 17.4% of adolescents ages 12-19 years are overweight;[8] this is an increase from previous data estimating 13% of children ages 6-11 years and 14% of adolescents ages 12-19 years.[2] A study that estimated the prevalence of obesity in 2003-2006, found that 11.3% of 2-19 year olds were at or above the 97th percentile, 16.3 % were at or above the 95%, and 31.9% were at or above the 85th percentile.[9]

Socio-economic status may be a useful indicator of the potential environmental and family risk factors related to overweight. Studies have shown that children living in low income families were more apt to be overweight or at risk for overweight, however subgroups have differed.[10-12] One study demonstrated the largest increases in overweight occurred among the 4-5 year old low income preschoolers.[13]

There is little literature on the prevalence and factors associated with overweight in Asian American, Hawaiian, and Pacific Island children. In a study done in Hawai'i from 1992-1996 using data of 1,437 public school children, multiple anthropometric indicators suggest there might be more children of Hawaiian ancestry who are overweight. There were twice as many Hawaiian and Non-Hawaiian Ancestry boys and girls that were classified as obese compared to the statistics in the National Health and Nutrition Examination Surveys.[14] An additional study of 20,000 children participating in the Women Infant and children supplemental food program noted large differences among the different ethnic groups in Hawai'i.[15] In a more recent Hawai'i-based study using student health records, the prevalence of overweight was calculated based on Body Mass Index. Almost one third of children entering kindergarten in Hawai'i public schools in 2002-2003 were overweight or at risk for overweight.[16]

There are several methods to determine adiposity that are very accurate but expensive and or invasive. The majority of health care providers use Body Mass Index (BMI).[6] BMI has recently been recommended for both adults and pediatric populations. The revised 2000 CDC pediatric growth charts include gender-specific BMI for age percentile distribution for ages 2-20 years and are currently used across all racial and ethnic groups.[17] When data was collected for this study, the standard measurement for "at risk for overweight" in children was 85-94% on the standard BMI percentile charts and "overweight" was considered at or above the 95%. The findings from this study will reflect these categories. Currently, the Expert Committee recommends using the terms overweight for 85%-94% and obese for 95% and greater.[10] There are no BMI for age references for obesity in children less than 2 years.[18]

This article presents the findings of a retrospective, cross-sectional study using a stratified random sample of children ages 2-10 years who received a physical examination at the Health Maintenance Organization (HMO) on O'ahu in 2003. This HMO is the second largest Health Insurance carrier for Hawai'i, covering 20% of the population. The purpose of this study was to identify the prevalence and factors associated with overweight children. To achieve this aim, the following research questions were explored:

1. What is the prevalence of overweight /at risk for overweight in the 2 to 10 year old age groups?
2. Is there a significant difference between overweight/ at risk for being overweight by age?
3. Is there a significant association between overweight/ at risk for overweight children and ethnicity?
4. Is there a significant association between children who are overweight/at risk for overweight and their socioeconomic status and/or their residence?

Methods

This study was approved by the University of Hawai'i at Manoa Institutional Review Board Committee on Human Studies and HMO's Institutional Review Board. A stratified random sample was selected from children with birthdates from 1993 to 2001 that accessed one of the 10 O'ahu clinics for a physical examination in 2003 (N=9,768). Random samples were stratified by age groups (2-3 years, 4-5 years, and 6-10 years). The final sample consisted of 554 children ages 2 to 10 years, including 179 in the 2-3 year age group (N=2,766), 187 in the 4-5 year age group (N=2,929), and 188 in the 6-10 year age group (N=3,951). A power analysis was computed for this population at a confidence interval of 95%.

Data were obtained on all 554 subjects via a chart review and information was recorded on a data collection tool developed for this study. The age of the child at the time of the 2003 visit and BMI were calculated for that visit. Other variables included the child's gender, ethnicity, socioeconomic status, blood pressure, family health risk factors, zip code, and medical history. The child's ethnicity was determined by parental report in the child's medical record. Data were coded and then entered into SPSS 11.0, and audited for accuracy. Ethnicity was recoded from 8 to 6 categories collapsing the very small categories (Hispanics, Blacks and others) into one category for analysis.

The following definitions were used:

Body mass index (BMI) is the ratio of weight in kilograms divided by the square of height in meters. In children, BMI is age- and gender-specific and reported in percentiles.

Overweight was defined as a BMI ≥ 95th percentile for age and gender.

At risk for overweight was defined as a BMI ≥ 85th percentile but less than the 95th percentile for age and gender.

Socioeconomic Status (SES) was based on the child's health insurance plan. QUEST is the state Medicaid managed care program for family incomes of up to 200% of the federal poverty level. QUEST was considered the low SES group and the Health Plan was considered the non-low SES group.

Place of Residence was determined by the zip code of residence located in the medical record. Zip codes were recoded into 4 categories including West O'ahu, Honolulu, Central O'ahu/North Shore and Windward O'ahu.

Data analysis included the calculation of percentages for nominal and ordinal data, and means and standard deviations for the interval level data. Calculations of percentages for prevalence of normal or underweight, at risk for overweight, and overweight categories were calculated for the entire sample and each age group. Cross tabulations, Chi-Square analysis, and Logistic regression were used for bivariate and multivariate analyses. A $p<.05$ value was considered as a significant value for this study.

Results

Fifty-four percent (n=300) of the subjects were boys and 46% (n=254) were girls. Table 1 provides a summary of the other demographic variables for this study. Nineteen percent (n=104) of children ages 2 to 10 years were overweight and another 13% were at risk for overweight. Overall, there was a significant difference in the prevalence of overweight status in boys (22%, n=66) compared to girls (15%, n=38); this trend continued with 15% (n=44) of boys and 10% (n=26) girls at risk for overweight in this age group (χ^2 8.405, $p< .015$).

There was a significant association between age categories and overweight and at risk for overweight children (chi square 34.526, p=0.000). As the age categories increased, the prevalence of overweight increased. For the at risk group, the prevalence of at risk for overweight children increased between the youngest group (2-3 years) and the two older groups (4-5 years and 6-10 years) (Table 2).

The highest prevalence of overweight children ages 2-10 years was in the Pacific Island children with 40% "overweight" and 18% "at risk" for overweight. Nineteen percent of Hawaiian/Part Hawaiian children and 19% of Filipino children were overweight. Caucasian children had the lowest percentage of overweight children; however they had the highest percentage of at risk for overweight children (21%). (Table 2).

In the bivariate analysis, there was a significant association between ethnic groups and weight categories ($\chi^2$20.172, p=0.028) and in overweight and at risk for overweight and place of residence (χ^2 17.288, p=0.008). The Windward O'ahu location had the highest percentage of children who were underweight or normal weight. There was no association between SES and weight categories in this study (Table 2).

The variables (Ethnicity/Race, SES, and Residence) were entered into a binary logistic regression model. The dependent variables for this analysis were under/normal weight, and at risk for overweight and overweight (BMI ≥85%). The model demonstrated a non-significant Hosmer & Lemeshow test (p=.648), indicating the data fit the model.[19] This model was able to classify 12% of the children who were at risk for overweight/overweight and almost all (97%) of those who were not; the overall model was able to classify 70% correctly. Pacific Island children were 3.6 times more likely to be at risk for or overweight. In addition, children living in Honolulu and West O'ahu were 2 times as likely and those living in Central O'ahu/North Shore were 3 times as likely to be at risk for or overweight when compared to children living in Windward O'ahu. (Table 3).

To further understand the subtle differences in childhood overweight that may occur within the ethnicity/race, socioeconomic status, and place of residence categories, a multinominal logistic regression using with 3 dependent variables (normal/underweight, at risk for overweight (BMI 85-94%), and overweight (BMI ≥ 95%)), was conducted. Children living in the Central O'ahu/North Shore area (p=.006) were significantly more likely to be at risk for overweight and children living in the West O'ahu area were more

Table 1. Demographic Characteristics of the Sample			
Variable		n	%
Ethnicity	Hawaiian/Part Hawaiian	236	42.6
	Pacific Island	38	6.9
	Asian/Part Asian	104	18.8
	Hispanic	15	2.7
	Filipino	102	18.4
	White	42	7.6
	Hispanics, Black & Other	32	5.8
SES	Medicaid (Quest)	160	28.9
	Non-Medicaid	394	71.1
Residence	Honolulu/East Honolulu	202	36.5
	Ewa/Waianae	162	29.2
	Central O'ahu/North Shore	73	13.2
	Windward	115	20.8

	2-3 years	4-5 years	6-10 years
<5%	13	5	2
<6-84%	70	60	56
85-94%	10	14	13
= or >95%	7	20	29

Figure 1. Percentage on BMI Growth Charts in Age Groups

likely to be overweight (p=.018) In addition, Pacific Island children were 6 times more likely to be overweight (p = .005).

Discussion

The study findings indicated a high prevalence rate of overweight and at risk of being overweight (overall 32%) in children who received a physical exam at the HMO on O'ahu. As the age groups increased, the prevalence for overweight increased. This data is similar to the prevalence of high BMI for similar age categories reported among US children from the 2003-2006.[9] This study supports similar findings from childhood obesity studies in Hawai'i. Almost one third of children entering kindergarten in Hawai'i public schools during the 2002-2003 were overweight or at risk for overweight.[16]

Initially in the 2-3 year age category, the "at risk for overweight" was higher than the "overweight" percentage, but as the age category increased the "overweight" percentage was greater than the "at risk for overweight" group. Several studies note a strong relationship between a child's weight status and adult obesity.[20,21] The older the child is when they are overweight, the more likely they will continue to be overweight or obese adults. Ritchie et al[2] noted that this trend starts as early as age 6 to 9 years. Sixty percent of children who were overweight during preschool and 80% of children who were overweight at 7 to 11 years of age were overweight at 12 years of age.[22] A study by Whitaker et al tracking BMI from childhood to adulthood notes that 75% of those with a BMI for age above the 85th percentile were obese as adults.[23] Adolescence has been cited as a critical period for the development of obesity-related co-morbidities. Studies demonstrate that up to 80% of overweight adolescents will become obese adults.[24,25] It has been suggested that the rising trend if continued will result in the next generation of children being more obese and less physically active than this generation.[26,27]

The study findings demonstrated a significant association between ethnicity and being overweight. Fifty eight percent of the Pacific Island children were overweight or at risk for being overweight. In the Hawaiian /Part Hawaiian group, 31 % were either overweight or at risk for being overweight. Each ethnic group had variations

Table 2. Number & Percentage in Weight Categories by Ethnicity, SES, & Place of Residence						
	Under- or Normal Weight (<85%)		At Risk (85-94%)		Overweight (= or >95%)	
	n	%	n	%	n	%
Ethnicity*						
Hawaiian/Part Hawaiian	164	70	27	11	45	19
Pacific Island	16	42	7	18	15	40
Asian	75	72	12	12	17	16
Filipino	72	70	11	11	19	19
White	29	69	9	21	4	10
Hispanic, Black, Other	24	75	4	12	4	13
SES**						
Medicaid (Quest)	112	70	19	12	29	18
Non-Medicaid	268	68	51	13	75	19
Residence^						
Honolulu/East Honolulu	136	67	22	11	44	22
Ewa/Waianae	110	68	17	10	35	22
Cental O'ahu/North Shore	44	60	18	25	11	15
Windward	89	78	13	11	13	11

* x2 20.172, p = 0.028; ** x2 0.218, p = 0.897; ^ x2 17.288, p=0.008

Table 3. Logistic Regression Model for Ethnicity, SES, Residence & at risk for overweight/overweight						
Variable	b	Wald Chi Square	p	Odds ratio	95% CI for Odds Ratio	
					Lower	Upper
Ethnicity						
Asian		14.565	.012			
White	.162	.161	.689	1.2	.532	2.6
Filipino	.034	.012	.913	1.0	.556	1.928
Pacific Island	.203	.560	.454	1.2	.719	2.088
Hawaiian/Part Hawaiian	1.380	11.801	.001	4.0	1.809	8.741
Hispanic, Black, Other	-.152	.105	.746	0.9	.341	2.160
SES						
Non-Medicaid	.162	.581	.446	1.2	.776	1.781
Residence						
Honolulu/East Honolulu		8.838	.032			
Ewa/Waianae	-.035	.022	.883	1.0	.610	1.530
Central O'ahu/North Shore	.393	1.872	.171	1.5	.844	2.604
Windward	-.597	4.497	.034	0.5	.317	.956
Constant	-1.036	12.688	.000	0.4		

Note: All ethnicity categories are compared to Asian/Part Asian category, SES was compared to Medicaid (Quest) category and Residence was compared to Honolulu/East Honolulu category.

in the percentages that were "at risk" and "overweight". When these two weight categories were combined, the difference among the ethnic/racial groups was less apparent (Filipino 29%; Asian 28%; Caucasian 31%). Caucasian children had the highest "at risk" percentage (21 %). Other studies with children living in Hawai'i have noted similar results.[14,15,28] Data indicates that Pacific Islanders (Native Hawaiians included) have some of the highest prevalence of obesity and type 2 diabetes.[28]

There was no association between the socioeconomic status (SES) of children in this study and being "overweight" or "at risk" for being overweight. This was a consistent finding observed with non-white females and Mexican American children.[30] For this study, SES was determined by a child's type of medical insurance. Other methods for determining SES, including parental or family income, parent's occupation, or education level may have yielded different findings. There was a significant difference noted in the child's place of residence and being "overweight' or 'at risk" for being overweight. One could argue that place of residence is not an independent variable but rather a proxy measure for SES based on the economic or ethnic/racial homogeneity within a specific area. In this study, when all these variables were put into a regression model, Central O'ahu children were more likely to be at risk and West O'ahu children were more likely to be overweight. The BMI in childhood may correlate with body fatness and overall health outcomes of a population, but the ethnic and other socio-demographic factors such as place of residence may influence these relationships. Peer and family social support, neighborhood opportunities and physical environment, and schools are important determinants for a child's physical activity level and overall well-being.[31]

There were limitations in this study. First, in any retrospective cross-sectional study design, the reliability of the data present is a limitation. The existing data did not always include the information that were needed or it may have been inaccurate. Documentation was handwritten and completed by a various health practitioners. A second limitation is that the study included children on the island of O'ahu in 2003 who received a well child examination. Neighbor island children may have experienced different environmental factors that may influence their weight status. Therefore, this study may not be representative of all children in the 2-10 year age group of Hawai'i. Furthermore, the SES indicator of "QUEST"/"Health Plan" used in this study may not be an accurate measure for SES. Finally, this study used BMI as a measure for weight categories. Chai and colleagues have suggested using multiple anthropometric indicators rather than a single one may be more accurate and appropriate for determining overweight in this population. [14] The relevance of the BMI must be considered in the context of the medical history, physical exam, and presence of co-morbidities. The validity of the BMI still remains an issue but its use is recommended as a trigger for assessment and intervention.[10] Tyrell et al stated that even though the BMI cutoff-points for children may need to be ethnic specific, this should not justify the use of different BMI percentiles.[29]

Recommendations

Findings from this study are the first to document the prevalence of "at risk for overweight" and "overweight" in a population of 2-10 year olds at a HMO in Hawai'i. The rate of overweight and obesity in the HMO population is consistent with both recent Hawai'i State and National Prevalence estimates. HMOs focus on keeping people well and invest in health promotion and disease prevention. This study contributes significantly to the understanding of the prevalence of childhood obesity and opportunities to intervene with prevention at the earliest possible time in a child's life, before they become overweight or obese.

Study findings support the aggressive implementation of Expert National recommendations for screening, monitoring, and stepwise intervention guidelines in the prevention of childhood obesity.[10,32,,33] The calculation of BMI and anticipatory guidance at all well child care visits is the first step at obesity prevention. Pediatric obesity has become a major focus as the new morbidity that threatens the health status of children and has implications into adult life. Public health interventions for children who are overweight needs to be directed at the primary prevention level. The difficulty in treating adult obesity has been documented and the potential future health care costs associated with children who are obese and its co-morbidities are overwhelming.

Interventions need to be initiated early in a child's life. Cook and colleagues report that clinicians diagnosed obesity in less than 1% of all visits.[34] Health Care Providers must target interventions that are developmentally age appropriate. Strategies should include nutrition and physical activity counseling that takes into consideration lifestyles of communities in Hawai'i, cultural aspects of parenting practices, and environmental influences. This study was conducted prior to the implementation of the electronic medical record (EMR). EMR systems can be instrumental in collecting accurate and complete health data, reporting prevalence data, and providing reminder cues for Health Care Providers.

The study's findings suggest there is a significant prevalence of overweight and at risk for overweight among this HMO population on O'ahu. Further studies should be directed at examining other age groups, including the under 2 year and over 10 year groups. It is vital for the health care providers to take the lead in prevention and early identification of overweight children. Understanding the prevalence in children is the initial step in instituting a primary prevention approach to obesity.

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Authors' Affiliation:
- Kaiser Permanente Hawai'i Region, Honolulu, HI (M.J.S., J.M.C., L.S.)
- School of Nursing & Dental Hygiene, University of Hawai'i, Honolulu, HI (M.J.S., V.P.N.)

Correspondence to:
Marialliana J. Stark DrPH, APRN-Rx, PNP-BC; Kaiser Permanente Hawai'i Region
2828 Pa'a Street, Honolulu, HI 96819; Ph: (808) 382-8216 / (808) 432-5611
Email: stark@hawaii.edu

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Pono (Balanced, True)

Race/Ethnic Differences in Desired Body Mass Index and Dieting Practices Among Young Women Attending College in Hawai'i

Susan M. Schembre PhD, RD; Claudio R. Nigg PhD; and Cheryl L. Albright PhD, MPH

Abstract

In accordance with the sociocultural model, race/ethnicity is considered a major influence on factors associated with body image and body dissatisfaction, and eating disorders are often characterized as problems that are primarily limited to young White women from Western cultures. The purpose of this study was to determine whether there are differences that exist by race in desired body weight; the importance placed on those ideals; and dieting strategies among White, Asian American, Native Hawaiian/Pacific Islanders, and other mixed-race young women in Hawai'i. A total of 144 female college students 18-20 years of age were surveyed about body weight as well as eating and exercise habits. Results demonstrated that all the young women wanted to lose weight. However, there were no differences in desired body weight or desired weight change by race after controlling for body mass index suggesting that current weight rather than race/ethnicity is the predominant influence on weight-related concerns. Young White women placed the greatest level of importance on achieving a lower body weight, which corresponded with a greater likelihood to be attempting weight loss (dieting) and greater endorsement of behaviors consistent with weight loss compared to their counterparts. Findings imply that, for young women, race/ethnicity may not have as significant an impact on factors associated with body weight ideals as previously believed. Rather, differences in the value placed on achieving a desired body weight, as it relates to disordered eating, should be further explored among race/ethnic groups.

Introduction

Research demonstrates that body dissatisfaction and weight-related concerns play a key role in the etiology of eating disorders[1,2] and other psychological disorders including depression,[3-5] particularly in young White women. In support of this, the sociocultural model of eating pathology posits that ethnic minority groups have fewer eating disturbances than Whites because there has been less cultural pressure to be thin.[6,7] However, weight-related concerns and behaviors consistent with dieting, and an increased risk for eating disorders are now prevalent among adolescents from various cultural backgrounds.[8-13] It is believed the drive to be "thin," commonly referred to as the "Westernized" body ideal, has become an international issue[14] due in part to globalized Western media.[15,16] It is generally accepted that youth in developed countries are differentially exposed to multimedia messages that can increase the likelihood of developing problem eating and psychological disorders. However, the extent to which young women with various cultural backgrounds are dissatisfied with their bodies is not well understood.

The sociocultural model suggests that factors such as peers, parents, and media play a major role in explaining dieting, issues related to body image, and eating.[7,17] In line with this model, race/ethnic identification has been considered a major influence on perceived body ideals with body dissatisfaction and eating disorders often being characterized as problems that differentially affect young White women from Western cultures more than other race/ethnicities.[18-20] As a result, a majority of the research in the area has been conducted on samples of White women and girls and there have been fewer studies that have focused on potential differences in perceived body ideals or weight dissatisfaction by race/ethnicity.[8] The role of ethnic differences in body ideals among young women living within the United States is of particular interest given the high exposure to thin body ideals in this country. The multicultural nature of the state of Hawai'i offers researchers rich opportunities to investigate these issues further. Two of the larger ethnic subgroups in the state are Asian Americans and Native Hawaiian/Pacific Islanders who, in the past, have been less likely to aspire to the "Westernized" thin body ideal. Specifically, Asian Americans are consistently shown to be at a lower risk for developing eating disorders given their smaller body sizes, but are more likely to endorse "Western" beauty standards.[8,21] Native Hawaiians and Pacific Islanders have typically been the heaviest of the ethnic subgroups in the United States and are more likely to value larger body sizes.[22-26] With the ever-changing race/ethnic composition of the United States and the perpetuation of the thin body ideal, research exploring race/ethnic differences or similarities in body weight ideals and other factors known to increase risk for eating disorders is needed.

Guided by the sociocultural model,[7,17] the purpose of this study was to determine if there are significant differences in desired body weight and weight control strategies by race among young women attending college in Hawai'i. This study adds to the limited amount of literature on weight-related issues among young Asian American women and explores the potential shift in changing body weight ideals of Native Hawaiians/Pacific Islanders. Findings will better inform pediatricians and other health care professionals about potential issues around body weight and weight control practices in the multiethnic youth living in Hawai'i.

Methods

Data Collection

This paper reports findings from a secondary data analysis of previously collected data used to explore the weight history and eating and exercise habits of university students in Hawai'i. Questionnaire items were collected via an on-line survey supported by SurveyMonkey.com during the Spring semester of 2010 at the University of Hawai'i at Manoa in the following order: demographics (including race/ethnicity) and data on body height and weight, desired body weight, weight control status, patterns of energy intake (fruit/vegetable intake and dietary fat intake), and physical activity participation. In the original study design, male and female college students of all ages were recruited from two large general education classes comprised predominantly of freshman and sophomore level students. All students were invited to participate in the study for class credit. Data for individuals reporting a prior eating disorder diagnosis, who were possibly pregnant, or reported having medically related dietary restrictions (eg, diabetes) were considered ineligible. A resulting sample of 281 students met eligibility criteria. In the current study the dataset was further limited to include only young women up to age 20 years in accordance with the definition of a child as established by the National Institutes of Health.[27] Analyses were not conducted for the young men due to small sample sizes by

race/ethnicity, which limited statistical power to detect differences. The final sample included in the following analysis is 144 young women. Protocols were approved by the University's Institutional Review Board.

Measures

Race/ethnicity was assessed by asking, "What is your ethnic or racial background?" and "Do you consider yourself to be Hispanic or Latino?" Eight categories were provided as response options for race based on the race/ethnic composition of Hawai'i and previously developed surveys.[28] Black/African American, White, Chinese, Filipino, Hawaiian, Japanese, Korean, and Mexican or other Hispanic. Students could select multiple race categories and/or write in a category that was not listed as a response option. Approximately 56% of the sample identified themselves as single-race and a maximum of seven race categories were selected by one participant. Only 12% of the sample identified themselves as Hispanic. The race variable coded for this study reflects four main groups: White; Asian (single-race)/Asian mix, including single-race and mixed-race Filipino (Hispanic and non-Hispanic), Chinese, Japanese, Korean, other Asian (eg, Thai and Vietnamese); Native Hawaiian/Pacific Islanders, including all individuals who selected Hawaiian or identified themselves as Pacific Islander (in the "other" category); and all "other mixed races," which included all other individuals.

Data on body weight status and desired body weight was collected by asking the following questions, "To the best of your knowledge, what do you currently weigh (in pounds)?" and, "How much would you like to weigh (in pounds)?" Students were also asked to report their height with the following question: "To the best of your knowledge, what is your height (in feet and inches)?" To standardize reported body weight for individuals' heights, body mass index scores (BMI; kg/m^2) were calculated. Desired weight was similarly converted into a standardized BMI score and will be referred to as *desired BMI* from this point. *Desired weight change* was calculated as the difference between reported weight and desired weight. Negative values represent the desire to lose weight. The *importance of achieving desired body weight* was assessed using a single question ("How important is it for you to achieve the weight you'd like to be?") with a 5-point Likert-scale with the following response format: 1=not at all important; 2=somewhat important; 3=moderately important; 4=pretty important; 5=very important.

Weight control status was assessed by asking, "Are you currently trying to achieve the weight you would like to be?" Three response options were offered: (a) Yes, I'm purposely trying to lose weight; (b) Yes, I'm purposely trying to gain weight; and (c) No, I'm not purposely trying to lose or gain weight.

Eating and exercise habits traditionally associated with weight control were assessed with multiple, validated instruments. *Dietary restraint* was assessed using the 16-item Weight-Related Eating Questionnaire [29] to address the cognitive strategies for weight control. Dietary restraint (6-items) can be broken down into two subscales addressing strategies for weight control on a *routine* basis (eg, counting calories and portion control) and *compensatory* strategies used to balance periods of (perceived) overeating. Calories from dietary fat (%) was calculated using the National Cancer Institute (NCI) Dietary Fat Scan,[30,31] which is a 17-item questionnaire that assesses the frequency at which high fat foods are consumed and provides an algorithm that estimates percent calories from dietary fat. Fruit and vegetable intake (cups) was assessed using the NCI All-Day Fruit and Vegetable Screener,[32, 33] which is a 19-item questionnaire that assesses frequency and portion size of servings of fruits and vegetables and provides an algorithm that estimates the frequency of cups of fruits and vegetables eaten daily. *Physical activity* was assessed using the International Physical Activity Questionnaire — Short Form,[34,35] which is a 7-item questionnaire that assesses the frequency and duration of physical activity during an average week. Established scoring protocols were used to compute hours per week spent walking and doing moderate- and vigorous-intensity activities.

Data Analysis

Analyses were conducted to examine if there were differences in body weight status, desired weight/BMI change, and weight control strategies by pre-defined race categories using analysis of variance and analysis of covariance in which BMI was included in the model where appropriate. Computed fruit and vegetable intake and physical activity values were non-normally distributed; therefore, square root transformation was utilized to normalize the data prior to conducting further analyses. Tukey post-hoc pairwise comparisons were used to identify significant differences between the subgroups. Person chi-square difference testing was used to determine if weight control status varied by race. Significance was set at $P<0.05$. All analyses were conducted with SPSS (version 16.0).

Results

Table 1 summarizes the characteristics of the study sample (n=144). All of the participants in this study were between 18-20 years old. A majority of the sample subjects were at either a freshman or sophomore level in college, and had a BMI reflecting underweight (8.8%; BMI<18.5 kg/m^2) or normal weight (80.8%; BMI<24.9 kg/m^2) as defined by the World Health Organization.[36] A large portion of the sample reported their ethnicity as single-race Asian or mixed-Asian descent with relatively equal distributions of Whites, Hawaiians/Pacific Islanders, and other mixed race (excluding Hawaiian). Compared to available University demographics,[37] the sample had a greater proportion of Asian/Asian mixed students and students of other mixed races, and a comparatively smaller proportion of Hawaiians/Pacific Islanders. Noted differences in the race demographics may be the result of variations in the question and/or response options on the surveys.

Table 1. Participant characteristics (n=144 young women)

Characteristic		%
Race	White	20.8
	Asian/Asian mix (including Filipino)	39.6
	Native Hawaiian/Pacific Islander	19.4
	Other mixed races	20.1
Year in College	Freshman	53.8
	Sophomore	31.5
	Junior	14.0
BMI	Underweight/normal weight	89.6

Mean age: 18.8±0.8 (Range: 18-20 years). Underweight/normal weight: BMI < 25 kg/m^2.

Table 2 summarizes differences by race in BMI, % with a BMI≥25, desired weight and BMI, desired weight and BMI change, and the importance of achieving body weight ideals. There were noted differences by race in BMI, desired weight, desired BMI, and importance of achieving their desired body weight among the young women. The mean BMI for each race group was within normal range (BMI=18.5-24.9 mg/kg^2) with young White women demonstrating a greater mean BMI compared to young women of Other mixed race. After adjusting for differences in BMI by incorporating the variable as a covariate in the model, only the importance of achieving desired weight remained significant. However, both the unadjusted and adjusted models indicated that young White women placed the greatest level of importance on achieving a lower BMI relative to all other race groups.

In line with findings in Table 2, Table 3 shows that young White women are also most likely trying to lose weight (dieting) despite being of under or normal weight (mean BMI<25). Similarly, of those young women who were dieting (Table 4), young White women reported lower dietary fat intake, more hours of walking during the week, and greater dietary restraint consistent with eating less following episodes of overeating (compensatory restraint). Race/ethnic differences in other behaviors, including hours of moderate and vigorous activity were not significant.

Discussion

Contrary to the sociocultural model,[7,17] which purports race/ethnicity has a major influence on weight-related issues, the current study indicated there are no differences in desired BMI by race after con-

Table 2. Race/ethnic differences in body weight status and body weight ideals of young women[1]

	White n=30	Asian/ Asian mix n=57	Native Hawaiian/ Pacific Islander n=28	Other mixed races n=29	*P*-value	BMI adjusted *P*-value
BMI	21.9±3.4^a	21.0±3.1^{ab}	21.8±3.5^{ab}	19.8±2.5^b	0.039	—
BMI≥25[2] (Percent)	10.0	10.5	17.9	3.4	0.365	—
Desired weight (Pounds)	126.2±14.2^a	116.6±12.8^b	124.9±17.9^{ab}	114.8±13.3^b	0.002	—
Desired BMI	20.1±2.0^{ab}	19.6±1.9^{ab}	20.5±2.2^a	19.0±1.8^b	0.030	0.227
Desired weight Change	-11.9±12.9	-8.5±11.7	-8.1±11.2	-5.0±7.2	0.132	0.186
Desired BMI change	-1.9±2.0	-1.4±1.9	-1.3±1.8	-0.8±1.2	0.148	0.227
Importance of achieving desired weight[3]	3.6±1.1^a	2.7±1.0^b	2.8±1.1^b	2.9±1.1^b	0.002	0.004

[1]Values with different superscripts varied significantly by analysis of variance and Tukey post-hoc tests with homogeneous subsets (p<0.05). [2]Chi-square tests used to examine categorical differences in % BMI≥25. [3]Importance of achieving body weight ideals: 5-point Likert-scale of importance (1=not at all; 2=somewhat; 3=moderately; 4=pretty; 5=very).

Table 3. Race/ethnic differences in weight control status

	White n=29	Asian/Asian mix n=57	Native Hawaiian/ Pacific Islander n=29	Other mixed races n=28	*P*-value
% trying to lose weight (dieting)	75.9	35.1	50.0	37.9	0.026
% trying to gain weight	3.4	5.3	3.6	3.5	
% neither trying to lose nor gain	20.7	59.6	46.4	58.6	

Analyses conducted with chi-square difference testing.

Table 4. Race/ethic differences in weight loss strategies of young women

Weight loss strategy	Dieting young women[1]					
	All non-dieting young women[2] n=75	White n=22	Asian/Asian mix n=19	Native Hawaiian/Pacific Islander n=14	Other mixed races n=11	*P*-value
	Mean±SD					
Dietary Restraint[3]	1.9±0.6	3.0±0.7^{a_}	2.7±0.6^{ab_}	2.3±0.6^b	3.1±0.9^{a_}	0.017
Compensatory Restraint	2.3±0.8	3.4±0.9^{a_}	3.1±0.8^{ab_}	2.4±0.9^b	3.5±0.9^{a_}	0.010
Routine Restraint	1.6±0.6	2.5±0.6^{_}	2.4±0.8^{_}	2.1±0.7	2.7±1.0^{_}	0.294
% calories dietary fat	31.2±4.6	29.2±3.8^a	30.6±4.0^{ab}	34.8±6.4^b	30.9±5.8^{ab}	0.023
	Median (Range)					
Cups of fruit/vegetable[4]	1.7 (0.2-7.8)	2.6 (0.3-7.0)	1.5 (0.3-5.0)	1.5 (0.8-4.9)	3.1 (0.6-5.4)	0.093
Walking (hr/week)[4]	3.5 (0.0-25.0)	7.0 (1.3-39.3)^a	2.0 (0.0-15.0)^b	1.8 (0.5-20.0)^{ab}	3.8 (0.8-10.5)^{ab}	0.014
Moderate-intensity activity (hr/week)[4]	0.0 (0.0-8.0)	1.7 (0.0-23.3)	0.0 (0.0-3.0)	0.5 (0.0-2.3)	0.8 (0.0-4.0)	0.055
Vigorous-intensity activity (hr/week)[4]	0.0 (0.0-17.5)	2.0 (0.0-16.7)	0.3 (0.0-4.5)	0.5 (0.0-6.7)	2.0 (0.0-6.0)	0.093

[1]Values with different superscripts varied significantly for dieting young women using analysis of variance and Tukey tests with homogeneous subsets (p<0.05). [2]Race-specific values for dieting young women varying significantly from non-dieting young women are denoted with _. [3]Dietary restraint and subscales of dietary restraint measured on a 5-point Likert scale with greater values denoting higher levels of endorsement for eat behaviors reflecting dietary intake regulation for weight control (Scores range from 1 to 5). [4]Fruit/vegetable and activity data analysis performed with square-root transformed variables, but is presented as untransformed for interpretative purposes.

trolling for BMI status. This suggests that current weight rather than race/ethnicity explains variations in personal body size preference. Most young women regardless of race desire a body weight that is less than their current weight, but the amount of weight they desire to lose appears to be more proportional to their current BMI rather than an "ethnically-specific" ideal. However, the importance placed on reaching a desired body weight was significantly greater among the young White women compared to Asian Americans, Native Hawaiians/Pacific Islanders, and those of other mixed races, which was reflected in the use of weight control strategies. Though body dissatisfaction was not specifically assessed, the findings of this study are consistent with the literature on the higher prevalence of body dissatisfaction and dieting in young White women, but they do not support the notion that Native Hawaiians/Pacific Islanders have a culturally-specific desire for a larger body size.

These findings call into question the robustness of race/ethnic differences in body weight ideals,[3,38] in particular those studies that have indicated that Native Hawaiian/Pacific Islanders desire a larger body size.[26] Of the ethnic/race groups more commonly shown to prefer a larger body size, the most robust differences have been demonstrated between Black and White young women such that Black women are consistently shown to have a more positive body image compared to White women.[39] Based on literature that similarly suggests that Native Hawaiian and Pacific Islanders traditionally value a larger body size, it would have been expected that this subgroup of women would more closely identify with Black women's positive attitudes towards a larger body size. However, this was not observed in this sample of Native Hawaiian/Pacific Islanders. On the contrary, the young Native Hawaiian/Pacific Islander in this sample did not vary from any other race groups on BMI or percent overweight/obese nor did they vary on desired BMI or desired weight change (after controlling for BMI). These findings imply that race/ethnicity may not have as significant an impact on desire for a "thin" body ideal [18] and may further suggest that the socio-cultural pressures to achieve thinness are so pervasive that they have reached all race/ethnic groups in Hawai'i.

A review of the literature in the area resulted in identifying four studies, published within the past 10 years, that explored race/ethnic differences in body dissatisfaction and other weight-related concerns in White, Asian, and/or Native Hawaiian/Pacific Island young women (<25 years).[12,24,40,41] Similar to the current study, no significant race/ethnicity differences in body ideals or body dissatisfaction were observed. Findings have also remained consistent when differences among specific subgroups of young Asian American women, including Japanese-, Chinese-, and Filipino-Americans, were examined.[24] In this study, the only race/ethnic differences that were observed were related to the importance placed on achieving a lower body weight (BMI) and the behavioral practices consistent with dieting. It was here that White young women varied most significantly from their counterparts showing that they were more likely to be dieting and practicing weight-control behaviors despite having a normal mean BMI (21.9±3.4 kg/m^2). Only one of the reviewed studies included a measure that addressed the extent to which the participants valued a thin ideal.[41] However, on this measure, Asian American and Whites did not significantly differ. Given that the use of weight-control behaviors so closely corresponded to the importance placed on achieving a lower body weight, it is suggested that future studies incorporate this construct.

Strengths/Limitations

This study is strengthened by the inclusion of young women of multiple ethnic backgrounds including Asians and Native Hawaiian/Pacific Islanders, who are typically underrepresented in research exploring the race/ethnic differences in body image and body dissatisfaction literature. Furthermore, findings support literature demonstrating body weight ideals of Hawaiians/Pacific Islanders are transitioning from larger body sizes to the thinner, "Westernized" body weight ideals.[15,23,42] Additionally, the inclusion of a variable reflecting the importance of achieving a desired body weight significantly enriches the findings in this study. This evaluative approach (importance) has merit in areas of behavior change related to decisional balance.[43,44] However, to our knowledge, this is only one of two studies that has sought to assess the value placed on achieving a thinner body ideal. Based on the findings in this study, it is possible that one's perceived importance of achieving a desired body weight could contribute significantly to predicting risk for eating disorders. This study provides support for future research to confirm this hypothesis.

The study is limited primarily by the secondary nature of the data analysis and limited sample size. First, a question regarding the student's unique (ie, strongest) racial/ethnic affiliation or identity was not asked (eg, "What racial/ethnic background do you most identify with?"). Among multiethnic individuals, aligning one's identity with one race more than another could help explain a lack of race/ethnic differences in factors related to body image and weight control, particularly within the sample of Native Hawaiian/Part-Native Hawaiians who are likely of mixed-race. Secondly, psychometric instruments often used in body dissatisfaction and eating disorder research such as the Pictorial Body Image Scale[45] or the Eating Disorders Inventory[46] were not incorporated into the data collection survey. Though one may desire to lose weight, this may not suggest body dissatisfaction. However, the findings were consistent with research that assesses body dissatisfaction. Similarly, participants were not asked about "unhealthy" weight control practices (eg, self-induced vomiting, diet pill, laxatives, and diuretics). Future research will be needed to address these constructs more comprehensively. Also, due to sample size limitations there were some observations that may have reached significance with a larger sample. We also had insufficient power to detect differences among Asian subgroups. There have been other published studies that suggest Chinese young women are more likely to be satisfied with their small body size whereas Japanese young women were highly dissatisfied with their body size though it was similar to the Chinese young women.[24] Lastly, there is limited generalizability of the findings given that the age of the sample was limited to 18-20 years, attending a local University. This sample was also leaner than a similarly aged sample of Hawai'i residents with 84.5% considered underweight or normal-weight compared to 54.4% reported for young adults age 18-24 years old surveyed by the 2009 Hawai'i Behavioral Risk Factor Surveillance System.[47]

Conclusion/Implications

Among young women, current weight (BMI) appears to play a larger role in the desire for a lower body weight than does race/ethnicity suggesting a desired BMI may be more personal than cultural. All of the young women were found to desire a body weight consistent

with a normal BMI, including the Hawaiians/Pacific Islanders, who traditionally have been reported to value a larger body size. This possible shift in preference could potentially lead to an increase in the prevalence of eating disorders in this population, of which local pediatricians, college physicians, and other health care workers need to be aware. The observation that the importance placed on achieving a desired weight corresponded with the use of weight control behaviors consistent with dieting among White young women may suggest that the construct of *importance* may have a potential role in identifying those at risk for eating disorders. Future research exploring the role of importance placed on achieving a desired weight will be needed to test this hypothesis.

Conflicts of Interest

This study and author SMS were supported by the Nutritional and Behavioral Cancer Prevention in a Multiethnic Population postdoctoral fellowship (R25 CA 90956). There are no conflicts of interest to report.

Authors' Affiliation:
- University of Hawai'i Cancer Center, Prevention and Control Program, Honolulu, HI (S.M.S., C.L.A.)
- Department of Public Health Sciences, University of Hawai'i, Honolulu, HI (C.R.N.)

Correspondence to:
Susan M. Schembre PhD, RD; University of Hawai'i Cancer Center, Prevention and Control Program; 677 Ala Moana Boulevard, Suite 200, Honolulu, HI 96813;
Ph: (808) 441-8184; Fax: (808) 568-3077; Email: sschembre@crch.hawaii.edu

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The Impact of an Elementary After-School Nutrition and Physical Activity Program on Children's Fruit and Vegetable Intake, Physical Activity, and Body Mass Index: Fun 5

Cara S Sandoval Iversen MS; Claudio Nigg PhD; and C. Alan Titchenal PhD

Abstract

Objective: This study evaluated the impact of the Fun 5 program on fruit and vegetable intake, physical activity, and body mass index (BMI) percentile of overweight and obese children in Hawai'i's A+ After-School Program.

Methods: Children in 4th - 6th grades (n=119, 55% female) from six randomly selected schools participated in this longitudinal study. Time 1 (T1) measures were taken October 2007 and time 2 (T2) measures April 2008. Height and weight along with a self-report survey were used to measure fruit and vegetable intake, physical activity, and BMI.

Results: The "at risk" population, defined as fruit and vegetable intake <5 servings per day (n=30), physical activity <300 minutes per week (n=78), or Body Mass Index >85th percentile (n=48) at T1, showed a significant increase in fruit and vegetable intake, from 2.97 (±1.16) servings per day at T1 to 5.60 (±3.93) servings per day at T2 (P=<0.01) and physical activity, from 125.26 (±76.03) minutes per week of physical activity at T1 to 222.18 (±180.90) minutes per week at T2 (P=<0.01) and no change in Body Mass Index.

Conclusion: The Fun 5 program had an impact on improving fruit and vegetable intake and physical activity on the at risk *population.*

Introduction

From 1999 to 2004, the percent of overweight children ages 6 to11 in the United States increased from 29.8% to 37.2%,[1] representing a 25% increase over a five year period. These statistics are consistent with the increased number of overweight children in Hawai'i. In 1984, a study found no significant under or over weight children in Hawai'i's schools but by 2002, 33% of the children entering kindergarten were overweight.[2]

Fruit and vegetable (FV) intake is negatively correlated with overweight or obesity in children.[3,4] The U.S. Department of Health and Human Services recommends 5 servings of FV a day.[5] However, the majority of Hawai`i's school children are not consuming the recommended 5 servings of FV per day.[6]

As is the case with FV intake, participation in physical activity (PA) is also a factor in childhood obesity. As the number of overweight and obese children has risen over the years, there has been a decrease in time spent participating in physical activity and an increase in time spent in sedentary activities.[7-9] Research shows children with higher PA levels have lower fat mass levels.[10] Because energy balance is dependent on both intake and expenditure, most weight loss or weight maintenance recommendations emphasize proper nutrition and increased levels of PA.

In 2002, the Fun 5 Physical Activity & Nutrition program partnered with the Hawai'i State Department of Education After-School Plus (A+) program to increase PA, improve nutritional status, and reduce the number of overweight children in grades K-6 throughout the State of Hawai'i. In the pilot year (2003) and the following dissemination school year (2004/2005), the Fun 5 program was successful in increasing moderate and vigorous PA and FV intake.[11-13] Although the improvements in PA and FV intake are encouraging, the effect of the Fun 5 Program on the children's body mass index (BMI) has yet to be investigated. Further, the effect of Fun 5 on "at risk" children — those who would stand to gain most from changing their behaviors, defined as children that consume <5 servings per day of FV, participate in <300 minutes per week of PA, or have a BMI ≥85th percentile — has not been documented to date. Therefore, the purpose of this research was to replicate the overall impact of the Fun 5 Program on children's FV intake, PA, and BMI and investigate the impact of Fun 5 for *at risk* children.

Methods

Participants

Six O'ahu public schools from A+ After-School program participating in Fun 5 were randomly selected from 115 schools using a random number table. It was estimated that six O'ahu schools would provide the number of children (n=79) needed to allow for meaningful results. The study population included school age children grades 4th–6th. The University of Hawai'i, Committee on Human Subjects, approved this research project. Only students with signed parental consent forms were allowed to participate in the study.

Intervention

The Fun 5 program is designed as a train–the-implementers process and relies in part on qualified Sports, Play, and Active Recreation for Kids, Active Recreation (SPARK AR) trainers within the A+ system. Training sessions are done annually in the beginning of the school year for all participating site coordinators, group leaders, and program aides. During training sessions, A+ staff are taught the skills necessary to implement and maintain the program. Training sessions include introduction to the Fun 5 program, SPARK AR physical activities, the nutrition component, and overview of the program evaluation.

The SPARK AR component has been developed for all out-of-physical education PA programs and is designed to provide substantial opportunities for all children to actively engage in movement. The SPARK program focuses on the development of a variety of basic motor and manipulative skills, such as throwing, catching, kicking, developing positive social skills, and the ability to get along with others by reinforcing ideas such as sharing equipment and demonstrating cooperative behavior. The goal of SPARK is to increase participation in activities and personal physical skill levels, while increasing confidence in the ability to be physically active and promoting a positive attitude toward PA and health.[14] The SPARK AR curriculum includes sections on management (eg, grouping, distributing and handling equipment, making teams) and instruction for inclusive activities that include four main areas: great games (eg, tag games, ball games), super sports (eg, soccer, Frisbee), dynamic dance, and other activities (eg, jump rope, relays). These activities are designed to be transferable to leisure activity in other settings (eg, home, park). SPARK AR is easy to use, as each activity is described and word-for-word instructions provided along with diagrams.

The nutrition intervention developed by Fun 5 program staff has an emphasis on FV and includes art projects that are designed to promote positive association with eating FV, for example creating posters with a rainbow of FV. Interactive nutrition booklets are provided for the children and incorporate information on FV in the form of coloring pages, cross-words, word searches, etc. During the training session, group leaders are encouraged to be healthy role models not bringing large sodas or fast food with them to the A+ program, but to be model eaters of healthy snacks during the A+ time. Positive reinforcement techniques were also encouraged at the training sessions which include giving high-fives when children bring healthy snacks.

Measures

FV intake was assessed by asking: "How many servings of fruits do you eat each day?" and the same question was asked about vegetables. An example of a serving size was included as part of the question. The single items addressing the average number of fruits and the average number of vegetables eaten each day have documented validity and reliability in adolescents[15] and are positively related to the five stages of change for FV intake in children.[16]

PA was assessed using an adaptation of Godin & Shephard's Leisure-Time Exercise Questionnaire.[17,18] Participants indicate how many days per week they engage in strenuous, moderate, and mild PA for 0, 10, 20, 30, 40, 50, or 60+ minutes when they are not in school. Levels of PA activity were defined as part of each question. In adults, the instrument was found to be significantly related to caltrac accelerometer readings (r=0.32), metabolic equivalents (METs; r=0.36), treadmill exercise time (r=0.57), percentage of body fat (r=-0.43), and VO_{2max} (r=0.56).[19] The instrument is also significantly related to the five stages of change for PA across populations[20,21] including children.[22] Sallis and colleagues (1993) reported good test-retest reliability (r=0.81) and adequate validity (r=0.39) when compared to kilocalories expended per day in a sample of 5th, 8th, and 11th graders.[23]

Weight was measured by gender-matched reseachers to the nearest .1 kg using a portable Health-o-Meter digital scale with a capacity of 330 lbs.

Height was measured by gender-matched reseachers to the nearest .1 cm using a Seca 216 Accu-Hite Stadiometer.

BMI was calculated using the CDC's online BMI calculator. The CDC BMI-for-age weight growth charts were used to establish the BMI status based on percentile ranking. BMI rakings were categorized as a BMI percentile <5th percentile underweight, 5th to <85th percentile healthy weight, 85th to <95th percentile overweight, and ≥95th percentile obese.[24]

Treatment fidelity was assessed via yearly interviews with all A+ site coordinators who reported the incorporation of PA at least three times a week and the accessibility to nutritional materials, which were summarized as the percentage of sites attaining these goals. Relatedly, implementation quality was the extent of consistency between program execution and research protocol which was evaluated through the 15-item SPARK session checklist[14] and summarized as a percentage during unscheduled visits at 10% of randomly selected sites (note: there is no protocol for a nutrition treatment fidelity site visit).

Procedures

The self-report measures were collected at the beginning and end of the 2007/2008 school year [October: Time 1 (T1) and April: Time 2 (T2)]. Data collection was repeated at T2 on those students who completed the first set of measures. This allowed for longitudinal comparison within the school year. The Statistical Package for the Social Sciences (SPSS) 16.0 and SPSS 17.0 were used for statistical analysis. A paired t-test ($\alpha = 0.05$) was used to analyze the impact of Fun 5 on FV intake, PA, and BMI from T1 to T2.

Results

Demographic characteristics are presented in Table 1.One hundred and nineteen children completed both T1 and T2 measures. Fifty-five percent of the population (n=66) was female. The 4th grade represents 46% of the population (n=55), the 5th grade 40% (n=47), and 14% of the sample was 6th graders (n=17). Note: The 5th grade is the highest grade in most Hawai'i elementary schools, which explains the smaller percentage of participants from the 6th grade. Children who completed T1 only (n=134, 54% female, 44% grade 4, 40% grade 5, 16% grade 6; data not shown) were not different demographically from children who completed T1 and T2.

Table 1. Gender, School, and Grade Distribution of Study Population (n=119)

Variable		n	%
Gender	Male	53	45
	Female	66	55
School	Site 1	29	24
	Site 2	14	12
	Site 3	23	19
	Site 4	27	23
	Site 5	8	7
	Site 6	18	15
Grade	4th	55	46
	5th	47	40
	6th	17	14

At T1 the children reported eating 7.67 (±4.68) and at T2 7.54 (±4.87) servings of FV per day (P=0.78). For PA, at T1 it was 252.35 (±220.09) and at T2 272.00 (±222.62) minutes of moderate to vigorous activity per week (P=0.37). The mean for BMI at both T1 and T2 was 71st (±25.13) percentile (P=0.97). Seventy-one out of 119 children were in the normal BMI category at both T1 and T2. The number of children in the obese category increased by 2 and the number of children in the overweight category decreased by 2 at T2 (Table 2).

In addition to evaluating the overall impact of the Fun 5 program, data analysis was run to evaluate the impact of the Fun 5 program on the "at risk" populations. The *at risk* population was defined as children that consumed <5 servings per day of FV, participated in <300 minutes per week of PA, or had a BMI ≥85th percentile at Time 1. Thirty-one children (26%) reported eating <5 servings per day of FV, 80 children (67%) reported participating in <300 minutes per week of PA, and 48 children (40%) had a BMI ≥85th percentile at T1. The *at risk* population showed a significant increase in FV

Table 2. Impact of the Fun 5 Program on Fruit and Vegetable Intake, Physical Activity, and Body Mass Index in Children Grades 4th,5th, and 6th					
Variables		**n**	**Time 1**	**Time 2**	**t (*P*)**
Overall Population					
FV Intake (servings/day)	Mean ± S.D.	119	7.67 ± 4.68	7.54 ± 4.87	0.28 (0.78)
	Median		6.00	6.00	
	% Increased				41.0
	% Same				13.7
	% Decreased				45.3
PA (min. of mod & vig. PA/week)	Mean ± S.D.	119	252.35 ± 220.09	272.00 ± 222.62	0.90 (0.37)
	Median		190.00	210.00	
	% Increased				51.3
	% Same				6.1
	% Decreased				42.6
BMI Percentile	Mean ± S.D.	119	71.49 ± 25.13	71.52 ± 24.63	-0.04 (0.97)
	Median		80.00	80.00	
	% Increased				46.2
	% Same				16.0
	% Decreased				37.8
BMI Category			n	_2 (p)	df
Normal		71	71		
Overweight		27	25		
Obese		21	23		
Total		119	119	0.34 (0.84)	2
At Risk Population					
[1]FV Intake (servings/day)	Mean ± S.D.	30	2.97 ± 1.16	5.60 ± 3.93	-3.74 (<0.01)
	Median		3.00	4.50	
	% Increased				73.3
	% Same				13.3
	% Decreased				13.4
[2]PA (min. of mod & vig. PA/ week)	Mean ± S.D.	78	125.26 ± 76.03	222.18 ± 180.90	-4.94 (<0.01)
	Median		120.00	160.00	
	% Increased				65.8
	% Same				3.8
	% Decreased				30.4
[3]BMI Percentile	Mean ± S.D.	48	92.98 ± 4.61	92.31 ± 6.27	1.30 (0.20)
	Median		93.00	94.00	
	% Increased				35.4
	% Same				35.5
	% Decreased				29.2

Note: FV = Fruit & Vegetables, PA = Physical Activity, BMI = Body Mass Index. [1]At risk defined as < 5 servings of FV per day at time 1. [2]At risk defined as < 300 min. of moderate and vigerous PA per week at time 1. [3]At risk defined as ≥ 85th percentile at time 1.

intake *(P*=<0.01) reporting an average FV intake of 2.97 (±1.16) servings per day at T1 and 5.60 (±3.93) servings per day at T2. As with FV intake, PA for the *at risk* population showed a significant increase *(P*=<0.01) in minutes per week of PA, reporting an average of 125.26 (±76.03) minutes per week at T1 and 222.18 (±180.90) minutes per week at T2. There were no significant changes in BMI percentile for the *at risk* population *(P*=0.20). The median and percent change supports the above data (Table 2).

Treatment fidelity indicators revealed a high percentage of successful implementation. The decision to execute PA at least three times per week was high (97%), accessibility to nutritional materials was high (85%), and the percentage of proper program implementation was also high (80%).

Discussion

The Fun 5 program had a positive effect on FV intake *(p*=<0.01) and minutes of moderate and vigorous PA *(p*=<0.01) in the "at risk" population. Although the sample size of the children reporting <5 servings per day of FV was small (n=30), these children reported an average increase of 2.63 serving per day from T1 to T2. At T2, this

population of children was meeting their recommended FV intake of 5 servings per day reporting an average FV intake of 5.60 servings per day. Seventy-eight children were participating in <300 minutes per week of PA at T1 and showed an average of 96.92 minutes per week or a 77% increase of PA at T2. These results are encouraging and indicate that the Fun 5 Program has a positive impact on FV intake and PA in the *at risk* population.

The overall effectiveness of the Fun 5 program on children's FV intake and PA is difficult to determine. At both T1 and T2 the children reported approximately of 2.5 servings above the recommended five servings of FV per day. Children are currently either eating the recommended number of FV servings per day, or possibly over reporting their FV intake. Research in the area of FV intake measures has shown a tendency to over report FV intake.[25] Over reporting may be the result of social desirability, an indication that these children are aware of the emphasis on FV intake, or that the Fun 5 program is successful in improving the children's awareness of the importance of eating more FV.

Although not significant, participants in the Fun 5 program reported an average increase of about 20 minutes per week of moderate and vigorous PA from T1 to T2. These results are promising as any improvement in PA is beneficial.[26] In addition, using the same self-report measures as this study, the Fun 5 program has consistently shown improvements in time spent in PA[13]. Similar school based intervention programs resulted in little or no change in physical activity. For example, no intervention effects were observed for activity or inactivity among the Baylor GEMS, Eat Well and Keep Moving, and HIP-HOP to Health Jr. interventions.[27]

The children's BMI percentile averaged in the 71st percentile at both T1 and T2 and no significant difference in the number of children in the overweight and obese categories was seen. Because children are growing, the observation of no change in BMI percentile and BMI categories is encouraging. A review of the effectiveness of school-based obesity intervention programs by Baranowski, et al, reveals that the BMI results are comparable to similar intervention programs.[28]

Of concern is the children's BMI average in the 71nd percentile and 48 children in the overweight and obese categories, which represented 40% of this population. Currently, the prevalence of overweight and obese US children is 31.9%.[29] Because this is a relatively small sample size the number of overweight and obese children in this study may not necessarily represent the A+ After School program population. Still these statistics warrant the need for ongoing research to combat the large number of obese and overweight children in Hawai'i's public after-school programs.

The measures employed, although practical, are not without limitations. BMI measurements may not accurately measure the degree of adiposity in children.[30] A three-page survey was developed to measure strenuous, moderate, and mild activity; sedentary behaviors, self efficacy, fruit intake and vegetable intake; knowledge of healthy eating; and parent modeling. The three-page survey proved to be challenging because of the children's relatively low attention spans. Also, collecting data in the field has the limitation of not being able to control the environment in which the measurements are taken. In order to collect the information, brief instruments were used to measure FV intake and PA. Objective observation, 24-hour recall for FV and PA, food frequency questionnaire, or accelerometers may produce more accurate data. Another limitation of this study was the lack of a control group. Although the treatment fidelity results indicate proper implementation and current results replicated the behavioral effects of Fun 5, a comparison with a control group would have added further validity to the evaluation of the effects of the Fun 5 program.

Although the Fun 5 program was designed to increase PA and FV intake, which would theoretically reduce the prevalence of obesity among Hawai'i's youth, there may be other positive outcomes to consider. Of interest would be improvements in academic performance and long-term reduction in development of chronic diseases such as diabetes and heart disease. Significant findings in any of the above areas would further validate the importance and benefits of incorporating obesity prevention programs such as the Fun 5 program into other programs in Hawai'i's public schools and the community.

We seem to be a long way from seeing a reversal in the trend of increasing overweight and obesity among U.S. children. Better understanding of the role of diet and PA in the development and prevention of obesity should be complemented with better understanding of impacting behavioral changes. How much influence the media, food availability, and sedentary lifestyles have on childhood obesity are also empirical questions. Ongoing research in the field of behavioral change theories and understanding the role of society and the environment on childhood obesity would facilitate the development and dissemination of effective obesity prevention programs such as Fun 5.

Disclosure Statement

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Authors' Affiliation:
- College of Tropical Agriculture and Human Resources, Human Nutrition, Food and Animal Sciences, University of Hawai'i, Honolulu, HI (C.S.S.I., C.A.T.)
- Department of Public Health Sciences, University of Hawai'i, Honolulu, HI (C.R.N.)

Correspondence to:
Claudio Nigg PhD; 1960 East-West Road, Honolulu, HI 96822
Ph: (808) 956-2862; Email: cnigg@hawaii.edu

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Po'okela (Excellence as a Constant Standard)

Development and Implementation of a Food System Intervention to Prevent Childhood Obesity in Rural Hawai'i

Rachel Novotny PhD, RD; Vinutha Vijayadeva PhD; Vicky Ramirez MS; Soo Kyung Lee PhD, Nicola Davison MS; and Joel Gittelsohn PhD

Abstract

This paper presents details the Healthy Foods Hawai'i (HFH) intervention trial, aimed to improve children's dietary behavior to prevent child obesity, by modifying the food environment with community-selected foods. Four communities were selected by ethnic composition, income level, two on O'ahu and one neighbor island. On each island one community was randomly assigned to intervention and one to control. The intervention was implemented through food stores in the intervention communities. HFH was designed to strengthen the network between local food producers, food distributors, storeowners and consumers, to increase the availability of healthier less energy dense foods for children in underserved rural communities of Hawai'i. The intervention includes phases: healthier beverages, snacks, condiments, and family meals. Moderate to high fidelity was achieved for educational materials (shelf labels, posters and educational displays). The number of educational displays varied by intervention phase and community. Posters were found in place 100% of the time. Shelf labels were found intact in the correct location. Low to moderate fidelity was achieved for distributors, with some products not stocked. In the intervention communities, 6-8 week phases focused on target foods with 40 food demonstrations. A total of 1582 food related samples were distributed. A high to moderate dose and reach of the overall intervention was achieved in delivery of the cooking demonstrations. A high to moderate dose and reach of the intervention was achieved overall; fidelity to the intervention protocol was moderate. To improve healthy local food availability in stores in rural communities in Hawai'i, agricultural producers reported needing additional support to sell and transport product to local stores, rather than to centralized distributors.

Introduction

This paper describes the development and implementation of the Healthy Foods Hawai'i (HFH) project, which aimed to modify the food environment of rural underserved communities to shift food availability and consumption to healthier local foods, to ultimately prevent and reduce child obesity. HFH built on strategies, goals and methodologies developed and tested in previous Healthy Store Projects. Previous Healthy Stores intervention trials showed success through focus on retailers and consumers (which was also a component in HFH). For HFH we additionally aimed to identify and create linkage opportunities between local food producers, food distributors, and food store owners, as a strategy to give consumers improved access to healthier food choices.

The authors conceptualize a multilevel model of influences on obesity[13] while focusing on the food environment to influence food behavior. We also draw on social-cognitive theory, recognizing that dietary behaviors are influenced by individual/personal factors. We measured the impact of the HFH intervention on parent and child diet and cognitive factors relating to diet. The HFH intervention program had significant dietary and psychosocial impacts, improving diets of children and self-efficacy of parents.[7] Thus, the HFH intervention was designed to modify several aspects of the food environment in order to incur healthier food consumption among minority children and their families in rural underserved communities in Hawai'i. Here we present details of the HFH program implementation and food system that was identified through formative and summative evaluation of the food environment of multiethnic rural Hawai'i. The programmatic approaches finally selected and insights gained into the Hawai'i food environment may be useful when designing other programs intended to improve the environment to change behaviors that can prevent child obesity.

Methods

Intervention Development and Design

Healthy Foods Hawai'i (HFH) intervention trial was a project of the Healthy Pacific Child Program (HPCP), which was developed after participatory strategic planning with the Healthy Living in the Pacific Islands Initiative (HLPI).[8] HFH was conducted in two of Hawai'i's communities, on two of its islands. Four communities were included in the study, two control/comparison communities and two intervention, with one control/comparison and one intervention on each island. Matching of intervention with comparison/control community was based on similarity of ethnic and income distribution, which was 10-27% Native Hawaiian and Pacific Islander, and >75% below the poverty level.[9] Five stores in the two intervention communities were randomly selected to implement the intervention.

HFH was a child-focused intervention program with a long term goal of reducing child obesity through increased healthy eating in Hawai'i's rural multiethnic communities. The HFH project was unique in its focus on children, and in its efforts to integrate additional components of the food distribution system (Figure 1); we use the term food "getting" since food was obtained by a variety of both monetary and non-monetary transactions. Figure 1 illustrates the food system as identified for the HFH project, based on community workshops and in-depth interviews with local informants. Stores were an important source of food, though food was also obtained at farmers markets, from gardens, from friends and family, and from restaurants. Food in stores was obtained from national distributors and local producers.

Formative work involved community workshops to develop HFH intervention messages, with an emphasis on local foods and agricultural products consumed by children.[10] The intervention aimed to increase the availability of healthy foods in stores in target communities through work with store owners and managers, and food producers and distributors; and to promote healthier food choices and food preparation methods through intervention messages in stores and local media. Messages were designed to encourage and foster gradual change in specific eating and food getting habits by adult caregivers and children. Promoted food items, themes, mass media material, and giveaways were implemented to resonate with the children.

Implementation of the intervention in the two intervention communities differed slightly. In one community, the intervention was delivered primarily by HFH project staff; in the other community,

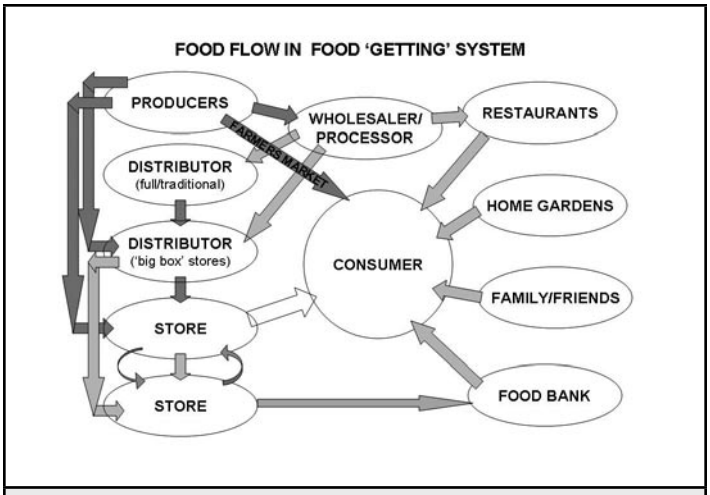

Figure 1. Food getting system* in rural Hawai'i

a local not-for-profit was contracted to deliver the intervention. Process data were only collected on the intervention in the intervention communities. Dietary outcome data was collected in all four communities (two intervention and two comparison/control) and is reported elsewhere[7].

The intervention was comprised of four phases, each running for 6-8 weeks. The phases targeted: i) healthier beverages (water, diet soda, lite nectars and 100% juices: ii) healthier snacks for children (whole grain, lower sugar cereals (WIC), low fat milk, fruit and vegetables with low fat dips, pretzels and baked chips): iii) healthier condiments (lite mayonnaise, low fat salad dressings and homemade dressings with herbs): and iv) healthier meals (drain and rinse ground meat, lite/low sodium Spam™ , tuna in water, fresh herbs, locally produced "chop suey" (greens) mix and watercress). These four phases were applied in both intervention communities in partnership with store owners and managers, food distributors, and local food distributors. Phase-specific educational materials were posted in various food, health, and community locations, and culturally-relevant cartoons were published in local neighborhood newspapers. Popular local recipes were modified, creating healthier versions.

In-Store Components

Selected stores were the primary sources for food purchasing in each community. Cooking demonstrations and taste tests were conducted in the five intervention stores (three in one community, and two in the other). Cooking demonstrations/ taste tests planned for 4-6 times per phase at each intervention store, with brochures and recipe cards distributed during the demonstrations/ taste tests. In-store posters, educational displays and shelf labels (Lower in Fat, Lower in Sugar, Healthy Food Choice, Healthy for Keiki (Child), Local Produce) were used as educational tools, with one set of materials per phase.

Agricultural Producer and Food Distributor Components

Two local producers and four local distributors collaborated with the project by providing promoted products and/or promotional items for taste tests and cooking demonstrations, and responding to key informant interviews. One producer had already worked with one of the local stores and had a small area in the produce section. The other producer had already supplied his product to the participating local stores but had only a limited amount of product available and, therefore, did not want to increase demand. This agricultural producer also provided a fixed amount of produce to one of the participating food distributors on a weekly basis, to be combined as part of the "chop suey" (greens) mix that was promoted during the intervention. Both of these local agricultural producers and their products were highlighted in store through the use of a "producer biography," which was a 4"x6" laminated card with a photo and brief biography of the farmer and farm which was hung above their product in the produce section.

As distributors already had products in most of the stores, collaboration centered on increasing the availability of HFH targeted products. Of the four food distributors involved in the project, one distributed canned nectar juice drinks, one snack foods, one milk and milk products, and the other acted as both an agricultural producer and a food distributor, growing produce, processing the produce, and distributing their own and others products. One or more of the food distributors provided product and/or promotional materials in each phase, and the agricultural producers supplied product during the specific phases that their produce was promoted. During phases 1-3, the food distributors (for milk, chips, nectar drinks and local produce) provided their products for use in the taste test/cooking demonstrations. Some also provided gift certificates and giveaways (e.g. pens, visors, fresh produce).

Process Evaluation Methods

The process evaluation measures evaluated reach (number of participants), dose (amount and frequency of exposure to intervention elements), and fidelity of the intervention (how closely the intervention was implemented as compared to the planned implementation and were categorized as: high=75-100%, medium 50-75%, low <50%). Evaluation instruments examined the amount of customer exposure to promotional materials and provided information on the nature and amount of interaction between customers and interventionists in the two intervention communities. A Store Visit Process Evaluation form (SVPE) and the Cooking Demo/Taste Test Process Evaluation form (TTPE) evaluated the process in the stores and in the community. Each form was completed twice a month by site visit in Community 1, and weekly in Community 2. The SVPE form evaluated success at keeping the promoted food items on the shelf, proper and intact labeling for promoted items, and phase-specific posters visible in the store settings. The TTPE form evaluated the process of bimonthly cooking demonstrations and/or taste tests conducted in the stores. This included the number of people who fully participated in the activity, the number of people that partially participated, and the number of people who passed by without engaging with the HFH staff. The Cooking Demo/Taste Test Participant Evaluation (CDPE) form evaluated community response to promoted items and/or promoted behavioral changes and rated the likelihood to purchase the promoted items or cook using the promoted methods.

The study was approved by the University of Hawai'i Committee on Human Studies. Informed consent was obtained for individual level data that was obtained. Quantitative data used in the present analyses of store data were entered using Microsoft Excel 2003, which was used to calculate means of intervention frequency, reach, and dose.

Results

Moderate to high fidelity was achieved for educational materials (shelf labels, posters, and educational displays), which were readily available in intervention store locations (Table 1). The number of educational displays varied by phase and community, from two to nine; in every case, community two used more educational displays. Posters were found in place 100% of the time. Shelf labels were most often found both in the correct location and intact (63 to one hundred percent of the time, depending on phase), though some foods had higher rates of missing/damaged labels or labels incorrectly placed under non-promoted foods. However a low to moderate fidelity was achieved for distributors/producers stocked items (75 to 100 percent of the time); some products were not stocked. Incorrectly placed labels occurred most often for foods that had high turn over, where items have to be frequently restocked (though not necessarily the promoted foods); these included chips, canned nectars, and luncheon meat. Incorrectly placed labels also occurred often in the produce section where produce was rearranged often, based on the season and quantity delivered to the store, or was damaged by the water sprayed on the shelves.

In interviews, food producers expressed concern about having adequate product, and cost of delivery to stores as compared to working with one central distributor, who will often pick up their product. Food distributors expressed need to sell as much product as possible in the shortest period of time, often resulting in removing newer (healthier) products on the shelf when existing (often less healthful) products with higher turnover could be stocked instead, even when the store owner was prepared to take the risk of lower turnover for a period of time, in order to support local farmers and the provision of healthy products. Although the price per unit of produce sold to food distributors tended to be lower than produce sold directly to local stores, the producers believed the cost benefit was not sufficient to cover the additional labor and transportation costs for them to work directly with local stores. Large produce processors/distributors pick up produce directly from farms, and provide transport of the produce the 30 to 40 miles to central processing facilities for cleaning, sorting, and packaging for subsequent re-distribution of the produce island-wide. Agricultural producers were also, on occasion, unable to produce sufficient quantity of produce at the required/requested time, due to production constraints such as weather, pests, and diseases.

In the two intervention communities, during nine months of intervention in four six to eight week phases that focused on target foods, there were 40 food demonstrations (22 in community one and 18 in community 2), that lasted a total of 84 hours (55.5 in community one and 28.5 hours in community two), Table 2. 1150 individuals participated in the food demonstrations (646 in community one and 508 in community two). A total of 1582 food related samples were distributed (868 in community one and 713 in community two). A high to moderate dose and reach of the overall intervention was achieved in delivery of the cooking demonstrations/taste tests (Table 2). The majority of the customers liked the promoted products (data not shown). For example, a blind taste provided participants with three types of luncheon meat (regular, low sodium and lite) and

Table 1. Fidelity of intervention (availability of promoted foods and print materials) in intervention communities by HFH intervention phase

HFH Intervention		Community 1					Community 2				
Phase	Foods promoted	No. Store visits	Times stocked during phase (%)	Times shelf label correctly placed (%)	Times poster posted (%)	No. educational displays	No. Store visits	Times stocked during phase (%)	Times shelf label correctly placed (%)	Times poster posted (%)	No. educational displays
1	Water	6	100	100	100	2	8	100	100	100	3
	Lite Drink		100	75				100	97		
2	Fresh fruit/ vegetable	12	100	100	100	4	12	100	100	100	6
	Low-sugar cereals		100	100				100	100		
	Low-fat milk		100	100				83	100		
	Baked chips		83	58				75	75		
3	Lite mayonnaise	8	100	100	100	4	36	94	83	100	6
	Low/fat free dressing		100	63				94	94		
	Herbs		100	63				94	81		
4	Fresh local vegetable	6	83	83	100	4	16	100	100	100	9
	Lite spam		100	83				100	88		
	Low sodium spam		100	33				94	100		
	Tuna in water		100	100				100	94		
	Cooking spray		100	100				100	94		

Table 2. Dose and reach of cooking demonstrations and taste tests in stores of intervention communities by HFH intervention phase, mean (SD)

HFH Intervention		Community 1				Community 2			
Phase	Foods promoted	Number of Demos	Hours per Demo	Number of Participants Per Demo	Number of Food Samples Per Phase	Number of Demos	Hours per Demo	Number of Participants Per Demo	Number of Food Samples Per Phase
1	Water, Lite drink	4	10 (2.5)	245 (61.3)	349 (87.3)	5	1.5 (7.5)	125 (25)	314 (62.8)
2	Fresh fruit/ vegetable, Low-sugar cereals, Low-fat milk, Baked chips	6	15.5 (2.6)	137 (22.8)	229 (38.2)	5	1.8 (9)	164 (32.8)	182 (36.4)
3	Lite mayonnaise, Low/fat free dressing, Herbs	6	17.5 (2.9)	135 (22.5)	160 (26.7)	5	1.5 (9)	138 (23)	136 (22.7)
4	Fresh local vegetable, Low sodium spam, Tuna in water, Cooking spray	6	12.5 (2.1)	132 (22)	131 (21.8)	5	1.5 (3)	81 (40.5)	81 (40.5)
Total All Phases		**22 (5.5)**	**55.5 (13.9)**	**646 (29.5)**	**869 (39.5)**	**18 (4.5)**	**28.5 (7.1)**	**508 (28.2)**	**713 (44.6)**

more than 90% of respondents (n=36) stated they would like to buy low sodium or lite luncheon meat. There was a reported increase in sales of those items. Healthier beverages were best liked among promoted and tested products.

Discussion

To our knowledge, this is the first store intervention trial to actively incorporate food distributors and producers. We found that the local food distribution network needed more support to increase availability of local produce in stores.

This study showed high fidelity, dose and reach of store intevention components, comparable with other studies. [11, 12] Availability was a challenge. Stocking decisions are not always controlled by store owners/managers. Greater support to agricultural producers would be an important future approach to improve healthy food availability in stores. Unique elements of this intervention that demonstrated good reach, dose and fidelity included the identification and promotion of "local" products in stores, and the provision of products by distributors for taste tests and cooking demonstrations. The taste tests and cooking demonstrations provided a unique opportunity for interactions between four intervention elements: producer/distributor (macro) and store/consumer (micro) environments. Interventionists provided educational and promotional activities to consumers using the store as a venue, while producers and distributors were offered the opportunity to showcase their products at minimal cost to themselves.

Working with multiple stakeholders to enhance use, the food distribution system (stores, food producers, food distributors) for healthy foods proved challenging, presenting institutional barriers to successfully integrate food system components needed to sustain the intervention. Nonetheless, the integration of community–based organizations into intervention delivery enhanced implementation and likelihood of sustainability. Researchers, clinicians and other health professionals may find application of formative processes to be useful for identifying and modifying other behaviors that influence health. Further, familiarity with community driven targets for strengthening healthy food behaviors, will help align efforts to shift the food environment toward healthier food, a critical component to prevent child obesity.

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Authors' Affiliation:
- Department of Human Nutrition Food and Animal Sciences, University of Hawai'i, Honolulu, HI (R.N., V.V., N.D.)
- Department of Public Health Sciences, University of Hawai'i, Honolulu, HI (V.R.)
- Research Institute of Food Nutrition Sciences, Yonsei University, Seoul, Korea (S.K.L.)
Correspondence to:
Rachel Novotny PhD, RD; 1955 East-West Road, Agricultural Science 216, Honolulu, HI 96822; Ph: (808) 956-7095; Email: hnfas.ctahr@hawaii.edu

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Kuleana (Privilege, Responsibility)

Letters, Opinions, & Reports

Using Coalitions to Address Childhood Obesity: The Hawai'i Nutrition and Physical Activity Coalition

Jay E. Maddock PhD; N. Nalani Aki MPA; Lola H. Irvin MEd; and Jennifer F.K. Dang MPH

Introduction

Childhood obesity is rapidly increasing in Hawai'i and the United States.[1] Recent research indicates that changes in the food and built environment may be contributing to this increase in obesity.[2] While individual behavior change and programs are important, population-based strategies are needed. The Centers for Disease Control and Prevention has identified policy and environmental change as a key component to stopping the obesity epidemic.[3] However, most public health practitioners cannot directly change policies or environments. Other methods are needed to influence key decision makers.

One potential tool for influencing policy change is the development of coalitions. Coalitions represent diverse groups of people coming together around a common goal and are often formal, multi-purpose and include long term alliances between agencies.[4] Public health coalitions started in the late 1980s and have become common across many health issues.[5] However, despite their promise half of all coalitions fail within their first year.[6] To be successful, coalitions should keep their structure simple, have the benefits of membership outweigh the costs, have active involvement of volunteer agencies, create a culture of trust and sharing, and evaluate their progress.[5]

To address the childhood obesity epidemic in Hawai'i as well as an overall lack of physical activity and poor nutrition the Hawai'i Nutrition and Physical Activity Coalition was developed. The rest of this paper will describe the development of this coalition and current direction.

Hawai'i Nutrition and Physical Activity Coalition (NPAC)

In 2006, over a hundred stakeholders worked together on developing the Hawai'i Physical Activity and Nutrition Plan.[7] The first objective of the plan was to "establish state and county coalitions to take the lead in advocating for systemic changes in physical activity and nutrition."[7] To address this objective the Healthy Hawai'i Initiative at the Hawai'i Department of Health provided funding to the Office of Public Health Studies at the University of Hawai'i at Mānoa to develop a statewide and three county coalitions.

Over the last three years, a statewide coalition as well as county coalitions in Maui, Kaua'i and Hawai'i County have been developed. Each coalition is staffed by a coalition director with support from the main Honolulu office. All coalitions have functioning steering committees as well as task forces to develop and implement their policy agendas. The Hawai'i Department of Health has provided on-going technical support and training to the coalition coordinators to ensure success.

While the coalitions have experienced some challenges over the past three years, there have also been major accomplishments. At the end of June 2010, statewide coalition membership had increased to 514. Major policy initiatives around Complete Streets and supporting local agriculture were underway. Additional funding was realized in Hawaii through NPAC efforts, including a Pioneering Healthy Communities grant to the Honolulu Metro "Y" to work on policy and environmental changes. Earned media opportunities around the state were being capitalized on to inform the public about important policy issues around physical activity and nutrition. NPAC provided testimony on several state and county bills and is rapidly becoming a recognized non-governmental, non-partisan brand on these issues. Coalition stakeholder surveys show a great deal of enthusiasm and support for the coalition moving forward. The Get FIT Kauai NPAC was instrumental in mobilizing support for the passage of Resolution No. 2010-48 on September 15, 2010, establishing a Complete Streets policy for the County. The County coalition is successfully aligning their county zoning to implement the state Complete Streets law, passed as Act 54 in 2009, now Chapter 264-20.5 in the Hawai'i Revised Statutes.

Over the next few years, many areas need to be addressed by the coalitions including identifying stable funding, increasing brand recognition, educating policymakers and the public on the need for health promoting policies, and supporting a healthier Hawai'i through systemic change. The first three years have provided a solid basis for growth and we expect that the next three years will lead to major achievements.

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The Hawai'i Nutrition and Physical Activity Coalitions are funded by the Hawai'i Tobacco Master Settlement Agreement through a contract with the Hawai'i Department of Health. We would like to recognize the hard work of all of the coalition members in making NPAC a success. Coalition membership is open to anyone interested in making a difference on physical activity and nutrition in Hawai'i. More information can be found at: www.npachawaii.org.

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Authors' Affiliation:
- Department of Public Health Sciences, University of Hawai'i, Honolulu, HI (J.E.M., J.F.K.D.)
- Healthy Hawai'i Initiative, Hawai'i Department of Health, Honolulu, HI (N.N.A., L.H.I.)

Correspondence to:
Jay Maddock PhD; Bio-Med D209, 1960 East-West Rd. Honolulu, HI 96822;
Ph: (808) 956-5779; Fax: (808) 956-6041; Email: jmaddock@hawaii.edu

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A Report on the Development of the Hawai'i Pediatric Weight Management Toolkit

Galen Y.K. Chock MD and Nicole Angelique Kerr MPH, RD

Introduction

The Hawai'i Pediatric Weight Management Toolkit (HPWMT) was developed as an evidence-based resource for health care providers to assist in implementing national recommendations concerning the identification, evaluation and counseling, treatment, and monitoring of overweight/obese children and adolescents. In November 2007, the HPWMT was presented to the medical community in a four hour continuing medical education session. Since 2007, some 350 healthcare professionals throughout the state have been trained in its use. The HPWMT offers a methodology enabling health care professionals to actively intervene with their patients and families and address the Hawai'i pediatric obesity epidemic one patient and family at a time.

Background

Childhood obesity constitutes one of the most pressing public health issues today as evidenced by First Lady Michelle Obama's national campaign to fight childhood obesity, Let's Move. Obesity in children is a risk factor for chronic diseases, including Type 2 diabetes, cardiovascular disease, hypertension, osteoporosis and some cancers.[1-2] There are also psychosocial consequences for overweight children; it may contribute to a delay in academic and social functioning as well as poor self-esteem and depression.[3-4] The latest NHANES survey by the Centers for Disease Control and Prevention, from 2007 to 2008, reported 10 percent of infants and toddlers and 18 percent of adolescents and teenagers were obese.[5]

Although Hawai'i is known to be one of the healthier states in the country, it is not immune to the American childhood obesity epidemic. A population based study of children entering kindergarten in Hawai'i from 2002 to 2003 showed that 28.5% were either overweight or obese.[6] A study of mostly low-income children attending a rural health center on O'ahu[7] found that 26% of children 2 to 19 years were obese and 16.5% were overweight. Certain ethnic populations and communities in Hawai'i have double the national rates of obesity. According to Chai et al,[8] in a 2003 study, the percentage of overweight 6 to 11 year old children of Hawaiian ancestry was 26.5% compared to 21% of children of non-Hawaiian ancestry.

Research studies suggest that interventions to prevent obesity should begin with younger children who are just developing food and activity preferences and habits.[9] Evidence based anticipatory guidance from pediatricians and family physicians is a logical first step that should be offered to families for prevention and if necessary identification, evaluation, and initial treatment of childhood obesity. Physical activity and nutritional choices are two essential areas that are known to affect weight, and thus child health.[10] In a study by Perrin et al[11] in 2008, the pediatrician's confidence and comfort level were increased when tools for obesity related counseling were available for their use. A study of the prevention and treatment of overweight in children and adolescents, concluded that the family physician should focus on early identification of the at-risk and overweight child and adolescents and include education for the patient and families illustrating the health problems associated with being overweight.[12]

The HPWMT was developed based on the premise that to consistently identify overweight children and initiate counseling, protocols and appropriate materials need to be developed and routinely incorporated into primary care pediatric offices.

Development Process

The co-author of the HPWMT drafted a patient educational pamphlet for families of children that were identified as being overweight. The families and patients appeared to value the material and the author began tracking the response of the evaluated children. Over a 1.5 – 2-year time period "successes" as described by parents and as evidenced by improved weight status was noted. The educational pamphlet and tracking information was presented to the Kapiolani Medical Center Obesity Task Force, then a work group was convened that applied for and received a grant from The Hawai'i Medical Service Association Foundation to develop the pamphlet into a "toolkit" for primary care providers. The goal of the HPWMT was to be a resource for primary care pediatricians to enable a uniform method of identification, evaluation, and intervention for overweight children and adolescents when no other health care resources (eg, dieticians, care coordinators, pediatric sub-specialists, or pediatric obesity multi-disciplinary clinics) were available.

The Toolkit is available as a 3-ringed binder organized in five sections.

1. Clinician Forms were designed to assist the clinician in eliciting readiness to change, relevant family medical history, eating, and physical activity history; and documentation of physical findings, assessment, and plans.
2. Seven patient education Healthy Eating Tip Sheets recommend portion sizes and a desired proportion of each food group during a meal. Specific food choices are presented based on an adaptation of the National Heart Lung and Blood Institute's We Can! campaign. The adaptation utilized the University of Hawai'i College of Tropical Agriculture and Human Resources' Hawai'i Foods Website[13] and added foods commonly eaten in Hawai'i.
3. Seven patient education Behavioral Intervention Tip Sheets offer details on specific strategies that physicians can recommend to parents and their families. All of the strategies, with the exception of "Rice Reality" are evidence-based. Rice Reality was included because of the known high consumption of rice in Hawai'i (personal communication USA Rice Federation) as well as its higher glycemic index and the current concern over the consumption of higher glycemic index foods and obesity.[14]
4. Monitoring tools.
5. Supporting material including Body Mass Index % curves by age and sex, the Kapiolani Medical Center for Women & Children's Pediatric Body Mass Index Guide, and overviews of motivational interviewing.

Focus Groups

With the goal of producing a toolkit that was useful for primary care health care providers and their patients in Hawai'i, focus groups of community based pediatricians and parents of overweight children were conducted. Focus group participants were recruited by convenience sampling. Two focus groups of community-based pediatricians were held in May 2007 in Honolulu. A total of 27 primary care pediatricians who were members of the Hawai'i Chapter of the American Academy of Pediatrics participated. The physicians were given a color copy of the draft "Hawai'i Pediatric Obesity Toolkit" (the original name of the manual). Using a pre-written script a facilitator (the dietitian co-author) reviewed each page of the Toolkit with the participants. They were asked about their opinion on the concept, content, layout, and design of the toolkit. The participants were provided dinner and given a nominal monetary amount.

The physicians agreed that a standardized approach to identification, evaluation and intervention would aid their practices and the HPWMT would be a resource they would use. They had concerns about using the word "obesity" in the title of the toolkit as they were worried about offending patients and their families. They were not sure how best to "label" the overweight child when engaged in dialogue with their patients and families. The behavioral intervention tip sheet "Beverage Battle" includes information about sugar-free diet drinks. There were concerns expressed about the safety of artificial sweeteners. The "Go, Slow, Whoa" food choices list was thought to be too restrictive and not practical enough for their families to follow.

Four focus groups of parents were held in July 2007. A total of 32 participants, primarily mothers, were recruited based on convenience sampling from local Women Infant and Children (WIC) programs and pediatrician offices. All participating parents believed they had at least one overweight child in their family. Groups were held at various locations throughout O'ahu including Downtown Honolulu, the Ala Moana Area, Waipahu, and Wahiawa. Participants were given a redrafted color copy of the "Hawai'i Pediatric Obesity Toolkit" that incorporated changes based on the feedback received from the previous physician focus groups. The same facilitator, using a pre-written script reviewed each page of the Toolkit with the participants. Parents were queried on terminology, asked to look at each form and handout and asked if there was anything that needed to be added, deleted, or changed, and their overall impression of the toolkit. Participants were given snacks and a nominal monetary amount for their participation.

The parents were enthusiastic about having the medical community actively address the pediatric overweight problem. One parent said, "Finally someone is doing something about this." They liked the content and presentation of the HPWMT and wanted to begin using it with their own children. They had concerns about the term "obesity" in the title and preferred "weight management" or "healthy lifestyle" instead. They could not offer a specific term for the overweight child that they would like to hear their physician use. The parents also had concerns about recommending artificial flavored drinks. Many parents wanted to receive specific daily caloric intake recommendations. They recommended early and frequent follow-up with the physician to monitor and reinforce behavioral changes.

Following the focus group meetings, the title was changed from the Hawai'i Pediatric Obesity Toolkit to The Hawai'i Pediatric Weight Management Toolkit. A section was added that summarized the FDA's acceptable daily intake of the various artificial sweeteners. The "Go, Slow, Whoa" food choices list was modified and expanded to make the "Go" and "Slow" choices more palatable. Although parents asked for caloric recommendations, the HPWMT process is not based on calorie counting, and hearing from the physicians that they were not comfortable in calculating caloric goals for overweight children, it was decided not to include any discussion or educational pieces on calorie counting.

Dissemination

The HPWMT was released on November 8, 2007 in a four-hour continuing medical education session in Honolulu. Subsequent trainings held in 2008 and 2009 were two hours in length and were held on O'ahu, Kaua'i, Maui and the Big Island. At the beginning of each session the participants received a HPWMT copy. Approximately 350 healthcare professionals have participated in HPWMT training.

In 2008, information was added to the original Toolkit that included additional behavioral intervention strategies (the role of breakfast and sleep and recommendations for pedometer use). Motivational interviewing has shown some successes in childhood obesity intervention.[17] Assessing readiness to change is an integral part of motivational interviewing, so readiness to change screening tools were added to the clinician forms. Feedback from physicians and parents was obtained prior to inclusion of these new forms in the Toolkit in a similar but smaller structured format conducted by the same facilitator as the original focus groups. These additional sections were provided to the latter half of the trainings sessions as the "Hawai'i Pediatric Weight Management Toolkit 2008."

Although the HPWMT was designed with the primary health care solo provider in mind, it has found additional use in the following settings:

1. Castle Medical Center's Wellness and Lifestyle Medicine Center developed a community education project in Waimanalo based on the HPWMT.
2. The HPWMT has been incorporated into Kaiser Permanente Hawai'i's smartset electronic medical record giving all of their providers access to this resource.
3. The HPWMT is used in the Kapiolani Medical Center for Women and Children's inpatient evaluation of the overweight pediatric patient.
4. In October of 2008, L & L Hawaiian Barbecue introduced the HAAPening Plate. This plate lunch based on the HPWMT's "Pass Your Plate, Please!" offers a healthy choice of barbeque chicken or salmon, ½ cup of brown rice, salad, and fruit. Details on the HAAPening Plate can be found at http://hawaiiaap.org/pdfs/HAAPening_Plate.pdf

The Toolkit is in the process of being evaluated at the Waianae Coast Comprehensive Health Center and the Kaiser Permanente Nanaikeolu Clinic by the Hawai'i Initiative for Childhood Obesity Research and Education (HICORE) funded by the Kaiser Permanente Hawai'i Safety Net Grant. This three year grant will examine the acceptability of the HPWMT for health care providers as well as patients.

Discussion

In December 2007, shortly after the release of the HPWMT, the American Academy of Pediatrics published the Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity. The expert committee recommends that clinicians actively address the pediatric obesity epidemic and advise patients and their families to adopt and maintain the following evidence supported specific eating and physical activity behaviors: (1) limiting consumption of sugar-sweetened beverages, (2) encouraging consumption of diets high in fruits and vegetables, (3) limiting television and other screen time, (4) eating breakfast daily, (5) limiting eating out at restaurants, (6) encouraging family meals, (7) limiting portion size, (8) eating a diet rich in calcium, (9) eating a diet high in fiber, (10) eating a diet with balanced macronutrients, (11) encouraging exclusive breastfeeding to 6 months of age, (12) promoting moderate to vigorous physical activity for at least 60 minutes each day, and (13) limiting consumption of energy-dense foods.[18]

The HPWMT addresses many of these evidence supported strategies and offers specific guidance for families that can help the clinician implement the 2007 expert committee national recommendations. An understanding of the background of the HPWMT will hopefully stimulate and encourage clinicians to review their own strategies for systematically engaging with their patients in prevention and with their overweight patients in identification, evaluation, and intervention.

There are some limitations of the HPWMT. The HPWMT was not subjected to a patient literacy evaluation so may not be effective for lower-literacy patients. The HPWMT is only available in English so will not be as useful to clinicians who service patients who are primarily non-English speaking. Recent literature has demonstrated the usefulness of interactive multimedia as a means to improve patient knowledge and behavior.[19] The development of HPWMT multi-media material to augment the written behavioral intervention tip sheets was stymied due to lack of funding. The effectiveness of childhood weight management intervention is dependent on the clinicians' ability to modify patient behavior. The HPWMT only briefly introduces the concept of motivational interviewing. Formal training in motivational interviewing as specifically applied to the HPWMT material would enhance its effectiveness.

The HPWMT is a locally developed resource that can assist physicians and other pediatric health care providers routinely identify, evaluate and manage patients with childhood obesity and help physicians guide the children and families of Hawai'i toward healthier choices, healthier weights, and the avoidance of adult chronic diseases.

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Authors' Affiliation:
- No affiliations (G.Y.K.C.)
- Deer Kerr Consulting, LLC, Honolulu, HI (N.A.K.)

Correspondence to:
Galen Y. K. Chock MD; 1380 Lusitana Street #501, Honolulu, HI 96813;
Ph: (808) 521-6030; Fax: (808) 521-6273; Email: gchock@aap.net

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Pa'ahana (Diligent, Focused)

Letter to the Editor: Childhood Obesity

Walton K.T. Shim MD

The fundamental causes of obesity are well established as an imbalance of energy input and energy output in a given individual. The existence of this simple paradigm of eating less and exercising more is not surprising given the marketing expenditures in the promotion of food consumption favoring weight gain and of the entertainment market forces that promote a sedentary calorie-conserving lifestyle.

There are in general two approaches to the management of childhood obesity: (1) Social and environmental control by education and policy mandates, and (2) Direct patient care. The first of these deals with fundamental social issues conducive to obesity such as nutritional advice, school policies, city design, and environmental law. Modifications in these areas are aimed at changing mores and usually require generations to take effect.

The second of these approaches addresses the care of the individual patient through dietary and behavioral modifications and the care of the morbid obese patient. A literature search and review of English language studies reveal that intensive and comprehensive behavior modification results in calorie control of food intake and increasing exercise to produce weight reduction and its benefits. Unfortunately this approach is followed by a high rate of failure when dealing with the morbidly obese patient. This paper deals with the eminent need for treatment of those who are morbidly obese and that have a current or projected health risk for the development of complications during early adult life.

The national and Hawai'i State childhood incidence for obesity is 16%. This gives Hawai'i a significant opportunity to participate in a national effort at obesity control and to meet an obligation to its minority citizens in an effort to decrease the mortality associated with obesity and its comorbid conditions of hypertension, diabetes, cardiopulmonary disease, renal failure, and their attendant health care costs.

Surgery is currently the most effective method for achieving significant long-term weight loss in severely obese adolescents (BMI 40, or BMI >35 with obesity-related co-morbidity) and can result in significant weight loss, reduction in co-morbidities, and improvement in quality of life.[1]

All the elements of a tertiary center for the care of adolescents with morbid obesity already exist in the community but there is a need to coordinate the individual community efforts. Currently there is an obesity clinic at the Kapiolani Medical Center for Women and Children for the medical control of obesity; bariatric surgery for adolescents is available through the Queen's Medical Center obesity program; expertise exists in the John A Burns School of Medicine Department of Pediatrics for dietary, psychological, behavioral, gastro-enterological, and endocrine management of the obese adolescent; and ethnic specific attention to the health problems of the State's minority population is available through the JABSOM Department of Native Hawaiian Health. It remains only to coalesce these existing components into an effective organization whose goal is to treat an obese cohort of Hawai'i's adolescents to both improve their health and control health care costs.

Two ingredients not mentioned are money and determination. The first requires funding and making obesity a billable illness. The second requires recognizing the value of life and health, and the potential decrease in health care expenditures.

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Correspondence to:
Walton K.T. Shim MD; Departments of Surgery & Pediatrics,
John A. Burns School of Medicine, University of Hawai'i; 1319 Punahou Street, Suite 1000, Honolulu, HI 96826; Ph: (808) 947-2611; Fax: (808) 946-2741; Email: wshim@hawaii.edu

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Laulima (Cooperation, Partnership)

Childhood Obesity in Hawai'i: The Role of the Healthcare Provider

May Okihiro MD

Childhood obesity in Hawai'i is a significant problem; in some of our rural and low-income communities more than 40% of children entering kindergarten are overweight or obese.[1] Studies in this issue of the Hawai'i Medical Journal Supplement highlight other concerns related to the development of obesity in childhood.

The current problems reflect the complex and rapid changes in our society over the last 30 to 40 years and our underlying biologic susceptibilities.[2] Think about your own childhood, what you ate, how you ate and played and the differences of your experiences from those of your children and grandchildren. For families living in poverty, or near poverty as many in Hawai'i do, the changes have been most dramatic and the solutions less apparent.

Individual behaviors including eating behaviors, food choice, and physical activity are shaped by the powerful influences of society and the environment;[3] today these include television, video games, work schedules, child-care realities, transportation barriers, and educational challenges. Unhealthy behaviors become embedded by social expectations and less obvious issues such as food insecurity, housing, employment barriers, and racism — issues that have likely worsened in this recent recession.[4]

The discussion around childhood obesity often involves personal and parental responsibility and choices in nutrition and physical activity. Focus on the individual is what we in health care have been trained to do; it is what we are comfortable doing. It has also been the prime focus socially and politically. Such a view takes responsibility away from government and industry.

But focusing only on the individual ignores the fact that we now live in world where the default and easiest choice is to remain sedentary and to eat large amounts of fat filled, sweetened foods. Caloric beverages are now the single greatest source of added sugar in the American diet.[5] Portion sizes have ballooned. Salt, sugar, and fat content have skyrocketed. Hawai'i's cultural traditions that embrace food as an offering of gratitude, graciousness and love have evolved to support this. The food incentives throughout a child's day include the Krispy Crème donut *omiyage* and the 1000 calorie "snack" bags after every soccer and baseball game starting from age five.

Studies have identified factors in the modern food environment that disable the body's physiologic and psychological regulatory systems that are supposed to govern the delicate balance between hunger, satiety, and weight.[6] These obesity generating forces have made it incredibly difficult to be "responsible" especially for those struggling with poverty and other modern stressors in life.

Health education is important. Kids and parents must become interested in behavior change and healthy lifestyles and have some knowledge and understanding on how to take those steps. Families must understand that disease can be prevented without feeling blamed. Education must be culturally sensitive and locally relevant. But of course we know that health education alone will not create behavior change. Healthy behavior change cannot and will not happen in a vacuum.

What is the role of the pediatrician and other heath professionals in the problem? Some fear that we will do more harm by talking about obesity. Some say that there is no proof that spending our time talking about weight and growth does anything. Is obesity really a high priority in the face of other health disparities? School failure, drug use, homelessness, mental health and behavioral concerns, and developmental concerns are all top priorities in childhood. These issues are all important.

While many physicians may doubt their influence, studies have shown that families trust and listen to their doctors.[7,8] I've pondered these questions at length and have informally asked parents and kupuna their thoughts. The overwhelming majority have been in favor of pediatricians talking about growth, chronic disease risk and nutrition. As one grandmother said, "If my doctor doesn't talk to us about these issues with us, who will?"

But if we are to bring about change and prevent childhood obesity and related diseases, we must support our families and begin addressing the issue at all levels — from the individual to the systems and policies that shape the environment. Healthier choices must become the default choice for children and families. Healthcare providers must become part of this collective change. As in the tobacco movement, health professionals must take on a dual approach, addressing both the individuals and the complex environment with a comprehensive array of medical and community interventions including community-wide campaigns, school-based interventions, mass media strategies, and action to bring about legal and regulatory changes.[9] The passage of a tax on sweetened beverages in Hawai'i is one such measure.

Addressing the Child and the Parent

The goal of our work as child health care providers is to optimize the health and well being of all children. We understand that talking to parents and children about weight and eating habits is not easy. However, parents expect an assessment of growth starting from infancy and discussions about weight can be framed around this expectation. Consider talking about their child's growth and indicate your concern about the child's risk for chronic disease. Most importantly promote health, well-being, and family support without imparting guilt or shame. Table 1 outlines some tips for child healthcare providers in the clinical setting to promote health and prevent obesity.

Addressing the Community

Child health care providers are seen as leaders in the community and a trusted source of information. Physicians and other health professionals thus have the opportunity to greatly influence and advocate for system changes at the local, state, and national levels that will support health through optimal education, nutrition, and physical activity for all children. Table 2 outlines some of the initiatives taking place in Hawai'i. Providers, already constrained by busy schedules, can lend support simply by becoming aware of the issues, signing petitions, promoting the issues and efforts to others especially parents. As Dr. Rita Lavizzo-Mourey from Robert Wood Johnson Foundation says, "Without programs such as these, physicians alone will not stop the progress of the epidemic and without the voices of physicians, these programs will not achieve their potential."[9]

Table 1. Promoting health and addressing the topic of childhood obesity
1. Regular growth assessment and counseling: a. Measure body mass index (BMI) at every well-child visit 2 years and older: Focus on the consistency of growth over time – some kids may grow consistently along a higher BMI percentile and may not be at risk for obesity-related disease. Be concerned about those with upward weight divergence b. Assess patterns about lifestyle –This includes consumption of sugar-sweetened beverages, screen time, physical activity as well as sleep and stress. Consider using a survey that the family fills out before they see you. c. Assess pertinent family history of diabetes, early cardio-vascular disease etc. d. Assess the family and community context of each child and family such as family and social support, food security, childcare and after school care as well as community environments. These factors will help providers understand the framework that has supported the development of obesity and how it might be addressed. e. Assess readiness to change and interest using open-ended questions – "Can we talk about your child's growth?" or "Have you thought about making some changes at home around eating?"
2. Target behavior change that is attainable and that the parent and child are interested in changing – eating meals regularly, eating meals with the TV off, serving more water. a. Focus on one behavior at a time. Don't demand a complete lifestyle overhaul. b. Commend parents for positive behaviors. c. Discuss these issues with families, not just those with weight issues.
3. Focus on "health and wellness promotion" and not obesity. Don't blame or nag.
4. The topic is VERY sensitive and emotionally charged. Consider avoiding the terms "overweight" and "obesity. " These terms promote weight-based stigma, guilt and often create immediate barriers.
5. Honor the role of the parent(s) in promoting healthy lifestyles and help them support and model healthy behaviors at home without overemphasizing weight.
6. Promote breastfeeding - Support and promote the development and implementation of peripartum policies and practices that optimize breastfeeding initiation and maintenance. For more information: http://aappolicy.aappublications.org/cgi/content/full/pediatrics;115/2/496

Table 2. Community Initiatives in Hawai'i
Hawai'i Initiative for Childhood Obesity Research and Education Based at the University of Hawai'i (UH) John A. Burns School of Medicine (JABSOM), the mission of Hawai'i Initiative for Childhood Obesity Research and Education (HICORE) is to provide leadership of collaborative, multi-disciplinary research and education in order to reduce childhood and adolescent obesity in Hawai'i. For information on educational and clinic resources on childhood obesity: http://www.hicore.org/
Hawai'i Nutrition and Physical Activity Coalition (NPAC) Based at UH JABSOM Office of Public Health Studies, the coalition advocates for system level changes and policies to improve physical activity and nutrition for the people of Hawai'i. It is funded by the Hawai'i Department of Health, Healthy Hawai'i Initiative and has paid NPAC Chairs on each island. For more information contact NPAC: http://www.npachawaii.org/
Hawai'i Department of Education (DOE) Wellness Guidelines The DOE recognizes that there are links between education, learning, nutrition, the food served in schools, physical activity and student wellness. To enable the development of life-long healthy habits, each of Hawai'i's public schools will implement the Wellness Guidelines by June 2011. This includes prohibitions for soda in vending machines, candy and cookies for fundraisers and revising recipes and products served in the cafeterias to meet USDA nutrition standards. Child health care providers in Hawai'i should be aware of these guidelines and support efforts in the communities they serve to implement the policies. http://doe.k12.hi.us/foodservice/toolkit/wellnessguidelines.pdf
Farm to School Farm to School connects schools and local farms with the objectives of serving healthy meals in school cafeterias, improving student nutrition, providing agriculture, health and nutrition education opportunities, and supporting local and regional farmers. Organizations involved: Kokua Foundation, Hawai'i NPAC, Hawai'i Island School Garden Network, Kauai School Garden Network. For more information: http://www.farmtoschool.org/HI/programs.htm
Built Environment **One Voice for Livable Islands Coalition:** The mission of One Voice is to achieve healthy community design in Hawai'i by making walking, public transportation and bicycling fundamental for transportation and recreation. We Pursue Our Mission through: Advocacy, Community Mobilization, and Public Education. Member Organizations include , AARP Hawai`i, Hawai'i Bicycling League, Hawai`i Public Health Association, Kailua Urban Design Task Force, Kauai PATH, Injury Prevention Advisory Committee, Maui Bicycle Alliance, PATH. For more information: http://www.hbl.org/content/one-voice
Safe Routes to School Hui The Hawai'i Safe Routes to School Hui and One Voice for Livable Islands is a network of non-profit organizations, government agencies, schools, and professionals working together to advance the Safe Routes to School movement and healthy community design in the State of Hawai'i. For more information: http://www.hawaiisaferouteshui.org/
Peoples Advocacy for Trails Hawai'i (PATH) Path is a grassroots organization based in Kailua-Kona. It works in partnership with other organizations across the state and the country to make it safe, fun and easy to walk, hike, ride a bike and live a healthy, active lifestyle in Hawai'i. Website: http://www.pathhawaii.org/

Conclusion

Childhood obesity is a significant issue in Hawai'i and a response to the changes in our community and environment over the last 3 decades. Research and our own individual experiences support the premise that lifestyle behaviors are influenced by powerful environmental and social factors. Currently the factors favor obesity. Addressing the issue and bringing about meaningful behavioral change on the individual level requires intense coordinated collective action by health professionals and the community to create systems changes and conditions to support personal healthy choices and lifestyles for all of Hawai'i's children and families.

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HICORE

Hawaii Initiative for Childhood Obesity Research & Education

Principal Investigator: Raul Rudoy MD
Director: May Okihiro MD, MS
Operations Manager: Romelynn Stein MPH

The mission of Hawai‘i Initiative for Childhood Obesity Research and Education (HICORE) is to provide leadership of a collaborative, multi-disciplinary effort in research and education to address childhood and adolescent obesity in Hawai‘i, especially among the most vulnerable of Hawai‘i’s children and families.

Members of the initiative represent many sectors of the local community and include members of the University of Hawai‘i John A. Burns School of Medicine Department of Pediatrics, Department of Public Health Sciences and Epidemiology, Department of Native Hawaiian Health, Department of Complementary and Alternative Medicine, UH School of Nursing, State of Hawai‘i Department of Health, State of Hawaii Department of Human Services, Hawai‘i Medical Association, American Academy of Pediatrics-Hawai‘i Chapter, YMCA and several other community organizations.

HICORE recognizes the work of the State of Hawai‘i Department of Health and the Hawai‘i Physical Activity and Nutrition Plan. HICORE efforts continue within the framework of this plan and in collaboration with the Hawai‘i’s Nutrition and Physical Activity Coalition.

The goals of HICORE:

1. To serve as a repository of childhood and adolescent obesity research projects conducted in Hawai‘i
2. To provide guidance to partner agencies and foundations regarding research priorities in the area of childhood and adolescent obesity for the state of Hawai‘i,
3. To serve as a center for the education of community members, students, residents, physicians and others in the area of childhood and adolescent obesity in Hawai‘i
4. To conduct research on childhood and adolescent obesity relevant to people of Hawai‘i

For more information, please contact us at info@hicore.org

Please also visit HICORE’s Website for information and resources for healthcare providers and researchers interested in childhood and adolescent obesity in Hawai‘i and the Pacific on our Website: www.hicore.org

Simple Steps for a Healthy Ohana

HAWAII 5 2 1 0 LET'S GO!

Healthy kids and healthy families make everything possible. Eating and physical activity patterns start in early childhood. 5-2-1-0 is our way of promoting healthy lifestyles for children and families. We realize healthy living can be challenging so we encourage everyone to start small, think big and take one step at a time.

EAT HEALTHY

5 FRUITS, ROOTS & VEGETABLES

Fruits, roots and vegetables, including root vegetables such as taro (poi) and sweet potato, are packed with nutrients. To get the amount recommended, most of us need to increase the amount of fruits, roots and veggies we currently eat.

HEALTHY TIPS

- A Be a role model - Include at least one fruit, root or vegetable at every meal and snack
- B When possible, avoid frying – try steaming, baking, stir-frying
- C Try-A-Bite rule - Offer new fruits, roots and veggies and encourage everyone in the family to try a few bites each time. It can take 7 to 10 tries to like a new food.

WATCH LESS

2 HOURS OF SCREEN TIME

Two hours or less of computer, video and TV screen time every day. Increased screen time has been linked to lower reading scores, behavioral problems and unhealthy weight.

HEALTHY TIPS

- A Encourage your whole family to decrease screen time to 2 hours or less each day
- B Keep the TV and computers in a central location and out of your child's bedroom
- C Enjoy your family - turn off the TV when eating and talk about the day

PLAY MORE

1 HOUR OF PHYSICAL ACTIVITY

Activity that makes your heart pump faster and your body breathe harder make you strong, helps you feel good and think clearly. Kids in active families are more likely to be active adults.

HEALTHY TIPS

- A Take gradual steps to increase your physical activity level
- B Do short amounts of activity several times a day until they add up to 60 or more minutes each day.
- C Physical activity should be fun – swimming, surfing, paddling, walking, running, dancing, gardening and yes, even vacuuming!

CUT DOWN

0 SUGARY DRINKS

Sugary drinks such as soda, sweetened tea, sports drinks, fruit punch and other fruit-flavored drinks have little health benefit. Sweetened beverages add empty calories, about 150 calories and 9 teaspoons of sugar per 12 oz. can of soda.

HEALTHY TIPS

- A Encourage your family to love water. Serve it. Choose it. If it's there, people will drink it. And remember water has zero calories.
- B Be wary of commercials. Juice products labeled "-ade,", "drink" or punch" often contain mostly corn syrup sweetener and less than 5% real juice.
- C For kids 2 years and older, encourage fat free or low fat milk rather than whole milk

For more information please contact us at **www.hawaii5210.com**