

Women in Guam consume more calories during feast days than during non-feast days

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Abstract—Parties (feast days) have become increasingly frequent and abundant, in terms of food, on the island of Guam. Considering the potential impact of this frequency and abundance on food intake, this study compared food intake during feast days and non-feast days of women in Guam (25 Chamorros; 24 Filipinas). The women (≥ 40 yr) recalled foods they usually consumed during feast days. Subsequently, a 24-hour dietary recall for a non-feast day was completed by a subsample ($n=25$). Height, weight, and waist circumference were measured to assess obesity status. Statistical analyses (paired t-test, ANOVA, and chi-square test) were performed with SPSS. Compared to a non-feast day, the women reported higher intakes of dietary energy (2645.0 ± 1125.8 versus 1654.0 ± 718.8 kcal/day), carbohydrates ($43.8 \pm 11.5\%$ versus $51.8 \pm 10.2\%$ of kcal), total fat ($34.1 \pm 7.8\%$ versus $27.5 \pm 9.6\%$ of kcal), saturated fat ($11.4 \pm 4.7\%$ versus $7.9 \pm 3.4\%$ of kcal), and sugar (89.5 ± 62.8 versus 47.3 ± 42.2 g/day) on feast days. Chamorros, compared to Filipinas, reported higher dietary energy density (1.7 ± 0.4 versus 1.4 ± 0.3 kcal/g), total fat ($35.3 \pm 8.9\%$ versus $30.7 \pm 6.8\%$ of kcal), and saturated fat ($12.4 \pm 4.9\%$ versus $9.4 \pm 3.3\%$ of kcal); and lower servings of fruit (0.5 ± 1.0 versus 2.7 ± 1.8) on feast days. Fourteen Chamorros (56.0%) and one Filipina (4.1%) were classified as obese. Current feasting behaviors of women in Guam may contribute to obesity if continued for a long period. The women would benefit by choosing more fruit and vegetable dishes in place of high-energy dishes. Chamorro women would particularly benefit by reducing saturated fat intake. Traditional foods, such as taro, breadfruit, seafood, fruits, and vegetables, would help accomplish this and thus should be promoted at parties on Guam.

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Introduction

FEASTING

Many cultures around the world partake in feasting, or eating an extensive meal often prepared in abundance and with special foods on special occasions (Fletcher 2005). Feasting occurs with celebratory events, such as African-American Kwanzaa, Spanish Fiestas, American Thanksgiving and Christmas holidays, and possibly during the weekends in America (Haines et al. 2003, Rhodes et al. 2006). Culturally, feasting is a naturally occurring phenomenon that acts as an “important way of ensuring that cultural traditions survive” (Fletcher 2005). Feasting also provides an environment conducive to overeating, which may lead to obesity if continued for long periods of time (Prentice 2001) or if engaged in with increasing frequency without counterbalancing with reduced caloric intake during non-feasting days.

FEASTING IN THE PACIFIC ISLANDS

Pacific societies engage in feasting as part of social and religious rituals. Examples of feasting in the Pacific Islands include the *malaga* in Samoa to celebrate the visitation of neighboring clans (Lal & Fortune 2000), the *inasi* ceremonies in Tonga to honor high chiefs (May & Hood 1983), and the *fiesta* in Guam and the Commonwealth of the Northern Mariana Islands to celebrate the feast day of a patron saint (Crumrine 1982). Feasting in the islands is characterized by the preparation of an abundance of foods, which necessitates the help of family members and friends (Lal & Fortune 2000, Paulino et al. 2008). Foods are so abundant that there is usually enough for each person to take food home; similar to Polynesian societies where little is eaten at the feast and most is taken home (Lal & Fortune 2000). Indeed the opportunity to take food home and share with others is a cultural expectation in the Pacific Islands (Pollock, 2003).

FEASTING IN GUAM

Guam is a United States territory located in the western Pacific. The native Chamorros regularly partake in feasts, a traditional pastime that continues today, on a weekly basis. Feasting occasions include the celebration of annual village fiestas, holidays, birthdays, graduations, weddings, rosaries, and funerals. These events hearken the spirit of *inafa'maolek*, or interdependence (Cunningham 1992), a value that underscores the Chamorro culture.

Traditional Chamorro diets prior to European colonization consisted of plant foods and had seafood as the main source of protein (Cunningham 1992). These foods have been replaced by energy-dense foods that are mostly imported and highly processed (Pobocik et al. 1999). Pobocik and colleagues (2008) reported that more than 90% of 400 men and women surveyed in Guam in 1995 and 1996 had consumed at least one fiesta meal per year. Unfortunately, dietary intakes during feast days were not measured. A fiesta on Guam often features an abundance and wide variety of foods (Paulino et al. 2008), where it is common for a feast plate to provide up to three times an individuals' daily caloric needs (Benavente et al.

1999). Furthermore, the prevalence of obesity and obesity-related chronic diseases on Guam is high. In 2009, 38.9% of adults in Guam were normal weight, whereas the rest were overweight (34.4%) or obese (26.8%) based on self-reported weights and heights (Centers for Disease Control 2010).

Although the study by Pobocik and colleagues (2008) found that people consumed at least one fiesta meal per year, preliminary observations indicate that Guam residents are more likely to attend one or two fiestas (or similar types of parties or feast days) per month. Given the frequency of feast days on Guam, and the abundance of rich food provided at these events, residents who partake in feasting may be more likely to consume excess calories during such days resulting in an increased risk for excess weight gain, obesity, and other potential health risks associated with obesity. The purpose of this study was to compare dietary intakes between feast days and non-feast days of women in Guam.

Methods

The University of Guam Institutional Review Board approved this cross-sectional study. The subjects were women (N = 49, 25 Chamorros and 24 Filipinas), ages 40 yr and older, who attended at least one feasting celebration between January 2004 and 2005. The women were volunteers recruited from celebrations, churches, and work sites. Advertisements were placed in the local newspaper and announced on local radio stations. Women were consented and interviews were conducted in a quiet room at the participants' churches, work sites, homes, or at the University of Guam.

A registered dietitian trained two research assistants who then collected weight and height measurements and 24-hour dietary recall data. Height was measured with a stadiometer in inches (Seca Mobile Stadiometer; Model 217), then converted to centimeters. Weight was measured with a digital scale in kilograms (Lifesource Precision Personal Health Scale; model UC-321). Waist circumference (cm) was measured at the umbilicus line using a tape measure. Body mass index (BMI) was calculated as weight in kg/(height in m)². Women were classified by BMI as normal weight (≤ 24.9), overweight (25.0-29.9), or obese (≥ 30.0) according to the National Institutes of Health recommendations (1998). Physical activity was measured by asking the participants the frequency that they engage in exercise per week according to the options used in the Futrex-5000A/WL body fat machine (daily or almost daily, 3 to 5 times per week, 1 or 2 times per week, a few times per month, less than once per month) (Futrex Inc. 1996), and if the practice was a regular routine.

A feast day generic 24-hour dietary recall was collected where each woman was asked to recall the foods that she usually consumed the entire day during a feast day. The previous feast day being recalled ranged from one day to four months prior. Most of the recalls occurred within a month of the feast day (8 were one day after, 11 were within a week, and 10 were within a month). A book of foods served at local feasts (Benavente et al. 1999) was used as a guide to prompt

and clarify recall. A 24-hour dietary recall, adopted from the Modified Three Pass Method (Guenther et al. 1997), was also administered during the interview and used to document the dietary intake of each woman during the day before the interview (if it was a non-feast day). This study was originally designed to describe dietary intakes only during a single feast day, but was later expanded to include a 24-hour dietary recall on a non-feast day for comparative purposes. Dietary data for non-feast days were therefore only captured for a subset of the participants ($n = 25$). Food models, serving utensils, and pictures were used as visual aids for all dietary assessments. Dietary intakes were entered in the Nutritionist Pro™ Nutrition Analysis Software (Axxya Systems, Version 1.2). Thirty recipes for foods commonly consumed at feasting celebrations on Guam were created in the Nutritionist Pro™ Nutrition Analysis Software, and included in the food composition data used for the nutrient analysis. Food group analysis were presented in servings, based on the Food Guide Pyramid updated in 1996 (Nestle 1998). Dietary intakes were entered by one trained research assistant and checked by another. A third researcher, a Registered Dietitian, reviewed and corrected all dietary data.

Energy density (ED), which is the amount of energy in a given weight of food (kcal/g), was calculated for each subject based on 24-hour dietary recall data of food intake (excluding all beverages (Ledikwe et al. 2005) and including nutritive beverages such as milk and juice). The total energy intake from the food consumed was divided by the total weight of the food reported. Beverages may disproportionately influence dietary energy density values (Ledikwe et al. 2005) and were therefore excluded.

Statistical analyses were performed with Statistical Products and Service Solutions (SPSS, Predictive Analytics Company, Campus Edition Software). A One-way Analysis of Variance (ANOVA) was used to compare dietary intake between the two ethnic groups. A paired *t*-test was used to compare dietary intake between feast days and non-feast days. Chi-square was used to test for the difference in distribution of categorical data (education, marital status, weight status, physical activity) between ethnic groups. A *P* value < 0.05 was considered statistically significant.

Results

DESCRIPTION OF THE PARTICIPANTS

Most of the women (96%) who inquired about the study were recruited and included in the analysis. Two women did not show for three scheduled appointments, and they were excluded from the study. Both women were Chamorro with a mean age of 50.5 ± 10.6 yr. The mean age of the women who completed the study was 50.2 ± 7.1 yr for Chamorros and 54.4 ± 9.0 yr for Filipinas (Table 1). The majority of the women had at least a high school diploma ($n=48$), and was married ($n=35$). The distribution in education and marital status differed between Chamorros and Filipinas. For example, most of the Chamorros (52.0%) were high school graduates and most of the Filipinas (58.3%) were college graduates.

Table 1. Demographics of the 49 women in this study.

	Chamorros (n=25) $\bar{x} \pm SD$ or Frequency % (number)	Filipinas (n=24) $\bar{x} \pm SD$ or Frequency % (number)
AGE	50.2 \pm 7.1	54.4 \pm 9.0
HIGHEST EDUCATION ^a		
Some high school	4.0% (1)	0% (0)
High school graduate	52.0% (13)	12.5% (3)
Some college	28.0% (7)	29.2% (7)
College graduate	16.0% (4)	58.3% (14)
MARITAL STATUS ^a		
Single	12.0% (3)	0% (0)
Married	72.0% (18)	71.0% (17)
Divorced	8.0% (2)	25.0% (6)
Common law	4.0% (1)	0% (0)
Widowed	4.0% (1)	4.0% (1)

^aChi-square distribution into categories significantly different between Chamorros and Filipinas ($P < 0.05$).

DIETARY INTAKE

The mean frequency of feast days per year was 25.8 \pm 26.1 days for Chamorros and 23.8 \pm 28.0 days for Filipinas. There was no effect of length of time since feast day on dietary intakes. Dietary intakes on a feast day and a non-feast day are shown in Table 2. Compared to a non-feast day, the women reported higher intakes of total energy (2645.0 \pm 1125.8 versus 1654.0 \pm 718.8 kcal/day), percent of energy from total fat (34.1 \pm 7.8% versus 27.5 \pm 9.6%), percent of energy from saturated fat (11.4 \pm 4.7% versus 7.9 \pm 3.4%), and sugar (89.5 \pm 62.8 versus 47.3 \pm 42.2 g/day) on a feast day. The mean energy intake reported during a feast day was 991 kcal more than during a non-feast day. The women also tended to report a lower percent of energy from carbohydrates (43.8 \pm 11.5% versus 51.8 \pm 10.2%) during a feast day than during a non-feast day. The energy density, percent of energy from protein, fiber, fruit, and vegetable intakes between a feast day and a non-feast day were statistically non-significant.

Chamorros, compared to Filipinas, reported higher dietary energy density (1.7 \pm 0.4 versus 1.4 \pm 0.3 kcal/g), total fat (35.3 \pm 8.9% versus 30.7 \pm 6.8% of kcal), and saturated fat (12.4 \pm 4.9% versus 9.4 \pm 3.3% of kcal); and a lower intake of fruits (0.5 \pm 1.0 versus 2.7 \pm 1.8 servings) on a feast day (Table 3). The feast day intakes for total energy, percent of energy from carbohydrates, percent of energy from protein, fiber, sugar, and vegetables were not different between Chamorros and Filipinas. Non-feast day dietary intakes (total energy, percent of energy from carbohydrates, percent of energy from protein, percent of energy from fat – total

Table 2. Comparison of dietary intakes of a subsample of women (n=25) during a feast day and a non-feast day.

	Feast day		Non-feast day		<i>t</i>	<i>P</i>
	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range		
Total energy (kcal/day)	2645.0 \pm 1125.8 ^a	1029.0–5165.0	1654.0 \pm 718.8	273.6–3511.8	4.247	0.000
Energy density (kcal/g)	1.7 \pm 0.3	1.1–2.2	1.5 \pm 0.5	0.4–2.4	1.418	0.169
Percent of kcal from carbohydrates	43.8 \pm 11.5 ^a	22.8–69.9	51.8 \pm 10.2	35.0–69.8	2.614	0.016
Percent of kcal from protein	21.8 \pm 8.0	9.9–39.0	19.6 \pm 5.3	8.5–34.6	1.175	0.251
Percent of kcal from total fat	34.1 \pm 7.8 ^a	18.0–52.5	27.5 \pm 9.6	11.9–45.9	2.639	0.014
Percent of kcal from saturated fat	11.4 \pm 4.7 ^a	4.0–21.5	7.9 \pm 3.4	3.0–17.7	2.802	0.010
Dietary fiber (g/day)	17.5 \pm 10.5	4.0–51.0	15.3 \pm 9.8	3.4–38.1	0.931	0.361
Added sugar (g/day)	89.5 \pm 62.8 ^a	10.0–297.0	47.3 \pm 42.2	1.0–191.7	2.976	0.007
Fruits (servings/day)	1.7 \pm 2.1	0–7.0	1.0 \pm 1.1	0–4.0	1.746	0.094
Vegetables (servings/day)	1.4 \pm 1.7	0–6.0	1.6 \pm 2.1	0–8.5	0.445	0.660

^a $\bar{x} \pm SD$ significantly different from non-feast day ($P < 0.05$).

and saturated, fiber, sugar, fruits, and vegetables) were not different between the ethnic groups (Table 4).

FEAST FOODS

The foods that women usually consumed during feast days were rich in energy, reflecting the shift in food consumption patterns. Meats, desserts, sodas and other sweetened beverages were frequently reported foodstuffs on feast days. There were distinct differences in feast foods reported by Chamorro women and Filipinas. Chamorro women reported five dishes that were not reported by Filipinas: Beef Kelaguin (beef soaked in a spicy lemon sauce), Eskabechi (fried fish and fresh vegetables soaked in an acidic sauce), Hagun Suni (taro leaves in coconut milk), Shrimp Kelaguin (shrimp soaked in a spicy lemon sauce), and Tinala' Katne (fresh beef seasoned and dried in the sun). Filipinas reported four dishes that were not reported by Chamorros: Embotido (stuffed ground pork), Chicken Ampalaya (chicken stir-fried with bittermelon), Kare Kare (oxtail cooked with vegetables and

Table 3. Comparison of dietary intakes between Chamorros and Filipinas during a feast day.

	Chamorros (n=25)		Filipinas (n=24)		<i>F</i>	<i>P</i>
	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range		
Total energy (kcal/day)	2554.2 \pm 1001.2	594.0–4668.0	2254.0 \pm 1084.9	527.0–5165.0	1.014	0.319
Energy density, (kcal/g)	1.7 \pm 0.4 ^a	1.0–2.6	1.4 \pm 0.3	0.8–2.1	5.476	0.024
Percent of kcal from carbohydrates	39.9 \pm 14.1	10.1–69.9	46.0 \pm 9.5	31.5–65.6	3.048	0.087
Percent of kcal from protein	24.0 \pm 8.5	10.6–39.0	23.4 \pm 7.8	9.9–39.2	0.063	0.802
Percent of kcal from total fat	35.3 \pm 8.9 ^a	16.7–57.4	30.7 \pm 6.8	18.0–40.9	4.132	0.048
Percent of kcal from saturated fat	12.4 \pm 4.9 ^a	3.7–21.5	9.4 \pm 3.3	4.0–15.2	6.298	0.016
Dietary fiber (g/day)	14.8 \pm 8.4	1.0–33.0	16.6 \pm 10.5	4.0–51.0	0.432	0.514
Sugar (g/day)	70.0 \pm 49.0	1.0–209.0	88.4 \pm 64.1	8.0–297.0	1.279	0.264
Fruits (servings/day)	0.5 \pm 1.0 ^a	0–4.0	2.7 \pm 1.8	0–7.0	27.56	0.000
Vegetables (servings/day)	1.6 \pm 1.9	0–6.0	1.8 \pm 1.7	0–6.0	0.100	0.754

^a $\bar{x} \pm SD$ significantly different from Filipinas ($P < 0.05$).

peanut butter), and Palabok (rice noodles topped with eggs, meat flavorings, and special sauce). Grapes, cantaloupes, honeydew, watermelon, bananas, and oranges were also reported by Filipinas on feast days, but were not reported by Chamorro women.

ANTHROPOMETRY AND PHYSICAL ACTIVITY

Chamorros, compared to Filipinas, had higher weight (72.8 \pm 12.3 versus 57.2 \pm 9.3 kg), BMI (30.2 \pm 5.2 versus 23.9 \pm 2.3), and waist circumference (96.1 \pm 9.6 versus 82.0 \pm 7.3 cm) in this study (Table 5). The mean height between the two ethnic groups was not different. The distribution of classification into weight status was different between the ethnic groups. Most of the Chamorros (56.0%) were classified into the obese category and most of the Filipinas (66.7%) were classified into the normal weight category. Exercise patterns were similar between ethnic groups. Most of the women reported exercising at least three times per week (60.0% in Chamorros and 71.0% in Filipinas), and that this was a normal routine (72.0% in Chamorros and 88.0% in Filipinas).

Table 4. Comparison of dietary intakes between Chamorros and Filipinas during a non-feast day.

	Chamorros (n=13)		Filipinas (n=12)		<i>F</i>	<i>P</i>
	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range		
Total energy (kcal/day)	1562.1 ± 868.9	273.6–3511.8	1753.5 ± 531.7	1067.5–2661.3	0.432	0.517
Energy density (kcal/g)	1.4 ± 0.5	0.4–2.0	1.6 ± 0.4	0.8–2.4	1.420	0.245
Percent of kcal from carbohydrates	50.0 ± 9.9	35.0–67.5	53.7 ± 10.2	38.9–69.8	0.861	0.363
Percent of kcal from protein	19.3 ± 6.5	8.5–34.6	19.8 ± 3.8	15.7–27.4	0.049	0.827
Percent of kcal from total fat	28.1 ± 9.4	13.1–45.9	26.9 ± 10.1	11.9–43.9	0.102	0.752
Percent of kcal from saturated fat	7.8 ± 2.5	3.8–12.5	8.0 ± 4.3	3.0–17.7	0.026	0.874
Dietary fiber (g/day)	14.2 ± 10.8	3.4–38.1	16.6 ± 8.7	5.5–31.2	0.371	0.548
Sugar (g/day)	55.7 ± 55.8	1.0–191.7	38.1 ± 17.8	19.1–69.0	1.083	0.309
Fruits (servings/day)	0.8 ± 1.4	0–4.0	1.1 ± 0.8	0–2.5	0.481	0.495
Vegetables (servings/day)	1.7 ± 1.9	0–7.0	1.5 ± 2.4	0–8.5	0.059	0.810

Discussion

FEASTING PATTERNS

On Guam, feast days have traditionally been associated with fiestas that are celebrated on a weekend (Crumrine 1982). In 1983, the mean daily energy intake among women in Guam was about 200 kcal greater on weekends than on weekdays (Kretsch & Todd 1985). The daily energy intake reported in this study is almost five times the amount in 1983. This increase, over a span of more than twenty years, is consistent with the growing body of literature describing a shift in dietary patterns from traditional to reliance on imported foods that has overwhelmed the islands in Micronesia (Malcolm 1958, Hankin et al. 1970, Kumangai 1975, Kretsch & Todd 1985, Pollock 1986, Pobocik et al 2008, Cheng 2010). There is a unifying message among all these studies – that traditional diets are nutritious, yet less energy dense, and should be encouraged to prevent obesity and related health problems. This message resonates as the obesity epidemic extends to the children of Micronesia (Leon Guerrero & Workman 2002, Durand 2007, Paulino et al 2008).

Table 5. Health measurements of the 49 women.

	Chamorros (n=25) $\bar{x} \pm SD$ or Frequency % (number)	Filipinas (n=24) $\bar{x} \pm SD$ or Frequency % (number)
ANTHROPOMETRY		
Height (cm)	147.7 \pm 26.2	153.7 \pm 5.7
Weight (kg)	72.8 \pm 12.3 ^a	57.2 \pm 9.3
Body mass index (BMI) ^b	30.2 \pm 5.2 ^a	23.9 \pm 2.3
Normal weight (BMI < 25.0)	16.0% (4)	66.7% (16)
Overweight (BMI 25.0-29.9)	28.0% (7)	29.2% (7)
Obese (BMI \geq 30.0)	56.0% (14)	4.1% (1)
Waist circumference (cm)	96.1 \pm 9.6 ^a	82.0 \pm 7.3
PHYSICAL ACTIVITY		
Exercise at least three times per week	60.0% (15)	71.0 % (17)
Normal exercise routine	72.0% (18)	88.0% (21)

^aSignificantly different from Filipinas ($P < 0.05$).

^bChi-square distribution into categories significantly different between Chamorros and Filipinas ($P < 0.05$).

Research on feasting behavior in these populations is sparse. Thus, identifying an effective intervention strategy to modify feasting behaviors poses a challenge. Numerous factors influence feasting behaviors, including an individual's response to environmental cues and dietary restraint (Mela 2001, Gibson 2006). Food choices at a feast depend a great deal on availability (Mela 1999). The abundance of food served at fiestas in the Mariana Islands (Crumrine 1982, Jorgensen 1987, Paulino 2008) provides an opportunity for indulgence, while the types of food served at these celebrations appear to have shifted over the years. Qualitative studies on factors influencing feasting behaviors would be useful. An immediate recommendation is to develop nutrition education materials and curricula that offer healthy fiesta (or party) options. For example, the Hagun Suni (taro leaves cooked in coconut milk) reported by the Chamorros in this study is very nutrient dense (Englberger, 2008). The coconut cream often added to the dish (Benavente, 1999) increases the caloric content, but could be modified by diluting the cream. Furthermore, incorporating other traditional foods, such as taro, breadfruit, seafood, fruits, and vegetables into the menu would improve nutrient density, and thus decrease energy density. The Cooperative Extension Service unit of the University of Guam has provided the community with nutrition education and materials as part of their outreach mission over the years. The Cooperative Extension Service could work with other organizations in the community to develop and disseminate materials that promote healthier fiesta (or party) foods, and to encourage residents to consume more local produce.

ANTHROPOMETRY

Compared to Filipinas, a higher proportion of Chamorros in this study were classified as 'overweight or obese' as measured by BMI and confirmed by waist circumference. If feasting behaviors is continued for long periods, particularly the excess consumption of energy on feast days by both ethnic groups, the prevalence of obesity among Filipinas may increase in the future.

The dietary factors that differed between the two groups were intakes of fat, fruits, and energy density. A post-hoc analysis (regression of obesity on dietary factors) showed no relationship among dietary factors and obesity. The pattern of weight status in this study is consistent with other findings (Leon Guerrero et al. 2008, Pobocik et al. 2008). Education and marital status was also disproportionate between the ethnic groups. Education has been shown to be inversely associated with obesity in adult female populations, regardless of the developmental status of the country (Montiero et al. 2001). A post-hoc analysis (regression of obesity on education) showed no relationship between the variables. A carefully designed study with a larger sample size is needed to clarify the range of factors associated with feasting that predispose to obesity.

LIMITATIONS AND STRENGTHS

This study had several limitations. First, the sampling frame was not random and only reflects 49 women, so generalizations are limited. Specifically, the sample for the paired t-test comparison between feast days and non-feast days was reduced as only a subsample of women completed the non-feast day 24-hour dietary recall. This explains the different mean values in Tables 2 and 3. Further studies with a larger sample would help confirm these results.

Second, the feast-day dietary recall method has not yet been validated. We believe that this is the first study to use such an instrument. The feast-day recall may introduce bias as a result of the nature of recall. We attempted to minimize this potential recall bias by asking the women about their usual intake during a feast day. We expect that the recall was reliable and represented usual intake for the following reasons: 1) the women reported attending a feast frequently, as much as twice per month; and 2) there was no effect of length of time since feast day on dietary intakes. The development of a validated feasting frequency questionnaire, or a usual intake 24-hour dietary recall methodology is needed for future studies on feasting.

Third, only one 24-hour dietary recall was used to measure dietary intake during a non-feast day. At least two 24-hour recalls per individual is recommended to estimate energy intake (Ma et al. 2009). A food frequency questionnaire for use in the Mariana Islands is currently under development, and could be used in future dietary studies in the region. Despite these limitations, this study was the first to compare dietary intakes during feast days and non-feast days in a population that regularly practices feasting. Women in this study consumed an average of 991 extra kcal on a feast day, and did this about twice a month, which could have serious health implications. Results of this study generate an interesting hypothesis; that increased rates of feasting has led to increasing rates of obesity.

Conclusion

Women in Guam consume excess energy (991 kcal more) during feast days compared to non-feast days, which may contribute to obesity. An immediate recommendation is to: 1) develop nutrition education materials and curricula that offer healthier, lower energy density, fiesta (or party) options, such as traditional foods (taro, breadfruit, seafood, fruits, and vegetables); and 2) encourage island residents to consume local produce. Future research studies on feasting (at fiestas or parties) and obesity in this population should include: a larger, representative sample; improved dietary assessment tools; and detailed measures of energy expenditure.

Acknowledgments

This study was funded in part by the Minority Institute/Cancer Center Partnership Program, University of Guam and the Cancer Research Center of Hawaii (grant No. 1056-CA-096278-01A1) and by the Research Initiative for Scientific Enhancement program, University of Guam (grant No. R25 GM063682). Special thanks to all the study participants.

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Received 16 Jan. 2009, revised 30 Sep. 2010