

Nutritional analysis of a fiesta on Guam

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Abstract—Fiestas in Guam are celebrated year round, but documentation of the preparation and nutritional components of foods served at a traditional fiesta on Guam is limited. Food preparation was observed during a fiesta celebrated in the village of Sinajana, Guam. A food scale was used to weigh the ingredients of food dishes. Nutritional analysis software was used to determine the nutrient content of each food dish served. Of the thirty-four dishes that were prepared and served, 32 dishes were analyzed. These dishes comprised 609,210 kcal, 38,761 g protein, 42,883 g carbohydrates, 30,260 g total fat, 10,019 g saturated fat, and 1890 g dietary fiber. More than 95% of the food prepared was potentially consumed. Of the food potentially consumed, 24% of the energy was from protein, 29% of the energy was from carbohydrates, 45% of the energy was from total fat, and 15% of the energy was from saturated fat. Of the top 10 foods contributing the most energy, 8 were *totche* (fish and meat) dishes. The nutrient availability for fiesta-goers was estimated. The assessment of fiesta nutrient intake is recommended for future research.

Introduction

Food sharing is a central focus of social gatherings in the Chamorro culture both past and present. The Chamorro people are the natives of the Marianas, a chain of islands in Micronesia. Before the introduction of the Spanish *Fiesta*,

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early Chamorro people already participated in many celebratory social events in which feasting was a great part. These events were characterized by “sporting events and debates during which oral histories were recited” and allowed for “friendly competition, peaceful interaction and the repayment of social obligations” (Russell 1998). Accounts by Garcia (1683), later translated by Margaret Higgins in the Guam Recorder between 1936 and 1939, state that during these entertainments “the men would recount with much laughter, their traditions and stories, and give out as refreshments rolls of boiled rice, fish, and fruits, and a drink made of *atole*, rice and grated coconut” (Higgins et al. 2004).

When Catholicism was established in Guam, these events became a celebration in honor of a patron saint associated with a village church or cathedral. Currently, thirty-four village feasts are celebrated on Guam throughout the year. The festivity begins with a *nobena* (novena or rosary) that is said daily for nine days. On the ninth day, a final *nobena* and mass is said at the village church or cathedral. After mass, villagers take the patron saint in *lukao* (procession) around the village. The entire island’s residents are then invited to a celebration full of food, music, and socialization. This offering of food is called *na’ taotao tumano*. Village residents also contribute by saying the *nobena* and hosting a feast at their homes, to which the island’s residents are invited (Crumrine 1982).

In modern Chamorro society, fiestas and other types of congratulatory events are celebrated almost every weekend somewhere on Guam, when family members gather to prepare an abundance of food. Several researchers have documented the social and cultural context of fiestas in Guam (Crumrine 1982, Iyechad 2001), but none have discussed the nutritional content or composition of foods served at such festivities. The purpose of this study was to describe the preparation and analyze the nutritional content or composition of foods served at a fiesta in Guam. Because fiesta celebrations are common, a description of the nutritional content or composition of foods served at these festivities will be an important part of a complete dietary assessment of the indigenous people of Guam and the Northern Marianas.

Methods

OBSERVATION

A family from a central village (Sinajana) in Guam volunteered to participate in this study. A meeting was held with the head of the household a week prior to the fiesta. At this meeting a tentative menu and the recipes for some of the dishes on the menu were provided.

Observation of the fiesta preparation and celebration took place on the day of the fiesta from 6:00 a.m. until 12:00 a.m. on October 25, 2003. Extended and immediate family members were present and assisted during the preparation. Male family members arranged the canopies, tables, chairs, and a bar station. Female family members cooked, cleaned dishes, and decorated. Some food dishes were prepared at the residence, while others were prepared elsewhere by

extended family and friends. For the foods prepared at the residence, the ingredients and recipes for each dish were carefully recorded. For foods prepared elsewhere, the recorded ingredients and recipes were based on a short interview of the individuals who prepared the dish. All dishes prepared elsewhere were brought to the residence by 6:00 pm. A mechanical food scale was used to weigh all prepared dishes. To supplement food weights, approximate volumes or quantities of foods were estimated using household measuring utensils.

The head of the household estimated that a total of 150 guests were present between 6 p.m. and midnight. At midnight, all dishes remaining on the table were identified and the approximate weights or quantities of leftover foods were recorded. A follow-up meeting with the head of the household took place two days after the fiesta. The data collected during the fiesta were reviewed and confirmed by members of the household.

ANALYSIS

Nutritionist Pro™ Software (Axxya Systems Version 1.2) was used to analyze the nutrient composition of the foods served. Nutritionist Pro™ Software is comprehensive and provides a complete nutritional analysis of diets, menus, and recipes (Axxya Systems 2007). Foods at this fiesta that had a default in Nutritionist Pro™ included Cassava Cake, Chocolate Cake, Custard Pie, Dinner Rolls, Sa'sime' (raw tuna), and White Rice, which were all used in the analysis. Substituted foods were Dried Meat (substituted with dried cured beef with toasted sesame seeds) and Steamboat (substituted with beef chuck, blade roast). The remaining dishes were mostly unique to Guam so the recipes had to be created using ingredients available in Nutritionist Pro™. All dishes were completely entered except for Deer Fritáda and Pig Fritáda. Animal blood is an important ingredient in these dishes, but this item was not readily available in Nutritionist Pro™. Blood was omitted from the recipe, but the remaining ingredients were included in subsequent analysis. Kimchee preparation took two forms; one contained cabbage, and the other contained cucumber and radish. Since there was minimal nutritional difference between the two types of Kimchee, they were combined in the analysis. Ham Leg, Pasta Salad, and the horseradish dip for Sa'sime' were excluded from the analysis because their initial weights and approximate volumes or quantities were unknown.

Weights and portions of the food dishes (except for Ham Leg, Pasta Salad, and the horseradish sauce for Sa'sime') were measured before the fiesta started. To calculate the total amount of nutrients prepared for this fiesta, the nutrients for the food dishes were summed. At midnight, the weights and portions of the remaining dishes were measured again. The amount of food remaining was used to estimate the proportion of food left over. For example, if 100 g of fried chicken was prepared and 20 g remained at midnight, then 1/5 was the proportion of fried chicken left over. This proportion was used to calculate the leftover nutrients for each dish. Referring to the same example, if the fried chicken provided 10 g of protein, then only 2 g of protein were left over (1/5 of 10 g = 2 g). The

Table 1. Thirty-four main food dishes served at a fiesta on Guam.

Category	Dish	Description
<i>AGGON</i> (STARCHY FOODS)	Dinner Rolls	Commercially prepared white rolls
	Pancit	Fried noodles with meat and vegetables
	Rice, Red	Unenriched white rice, salad oil, salt, black pepper, cooked in annatto-colored water
	Rice, White	Cooked, unsalted unenriched rice
<i>TOTCHE</i> (FISHES AND MEATS)	Tamáles Gisu	Steamed masa harina (corn meal) prepared similarly to Red Rice
	Chicken, BBQ	Chicken marinated in soy sauce, vinegar, herbs and spices & barbecued
	Chicken, Fried	Seasoned, buttered, battered and then deep fried chicken
	Chicken, Kelaguin	Finely shredded chicken mixed in a spicy sauce made with lemon (Optional: coconut and scallions)
	Chicken, Soup with Corn	Chicken, corn, and coconut milk soup
	Fish	Reef fish smothered with mayonnaise, onions, and tomatoes and cooked in tin foil
	Fritáda, Deer ^a	Fresh deer meat and organs stewed in deer blood
	Fritáda, Pig ^a	Fresh pig meat and organs stewed in pig blood
	Ham Leg ^b	Leg of ham seasoned and roasted
	Lumpia, Fried	Deep fried meat rolls (similar to spring rolls)
	Mackerel (Atulai), Fried	Seasoned and deep fried mackerel
	Mackerel (Atulai), Kelaguin	Mackerel mixed in a spicy sauce made with lemon (Optional: coconut and scallions)
	Pig, Roasted	Whole pig with skin, roasted
	Sa'sime' ^c (Sashimi) ^c	Raw tuna fish dipped in horseradish sauce
	Shrimp Patties	Shrimp and mixed vegetables in a flour, milk, and beer batter
Skipjack (I'e'), Kelaguin	Skipjack tuna mixed in a spicy sauce made with lemon (Optional: coconut and scallions)	
Spareribs, BBQ	Pork spareribs marinated in soy sauce, vinegar, herbs and spices & barbecued	
Steamboat	Beef chuck, blade, slow roasted	

Table 1, cont.

Category	Dish	Description
<i>GOLLAI</i> (VEGETABLES)	Dried Meat (Tinala' Kâtné)	Fresh beef seasoned and dried in the sun
	Coleslaw	Shredded cabbage and carrots in a mayonnaise-based sauce
	Eggplant in Coconut Milk (Lechen Birenghenas)	Eggplant mixed in coconut milk and spicy sauce made with lemon, barbecued
	Kimchee	Pickled cucumber, cabbage, and horseradish in a spicy sauce
	Salad, Pasta ^d	Pasta curly noodle, cucumber, black olive, tomato, carrots, deli ham, and deli turkey in vinaigrette sauce
<i>FRUTA</i> (FRUITS)	Salad, Potato	Potato, eggs, olives, relish, and pimientos in mayonnaise
	Salad, Fruit	Canned mixed fruits with Coolwhip®
<i>POSTRE</i> (DESSERTS)	Cake, Cassava	Sticky cake made with cassava
	Cake, Chocolate Pie, Custard	Classic chocolate cake Classic custard pie
SIDES	Fina'dene, Lemon	Spicy sauce made with lemon
	Fina'dene, Soy Sauce	Spicy sauce made with soy sauce

^a Blood not included in nutrient analysis because the ingredient was not available in the Nutritionist Pro™ Software.

^{b,c,d} Ham Leg, horseradish dip for Sa'sime', and Pasta Salad not included in nutrient analysis because the initial weight and quantity were unknown.

nutrients left over for each dish were summed to estimate the total nutrients left over at this fiesta. The amount of nutrients potentially consumed was calculated by subtracting the total nutrients left over from the total nutrients prepared.

Results

A description of 34 food dishes prepared for this event is provided (Table 1). Food dishes were accordingly: *Aggon* (starchy foods), *Totche* (fish and meats), *Gollai* (vegetables), *Fruta* (fruits), *Postre* (desserts), and Sides. The host prepared 11 food dishes. The other 23 food dishes were prepared elsewhere and brought by family and friends.

Total nutrients for all food dishes prepared provided a total of 609,210 kcal, 38,761 g protein, 42,883 g carbohydrates, 30,260 g total fat, 10,019 g saturated fat, and 1890 g dietary fiber (Table 2). More than 95% of the food prepared was

Table 2. Energy and nutritional content analysis for all of the food prepared and potentially consumed at the fiesta.

	Prepared	Left over	Potentially consumed
Energy, kcal	609,210	29,865	579,345
Protein, g	38,761	3,541	35,220 g (24.3% of kcals)
Carbohydrate, g	42,883	409	42,474 g (29.3% of kcals)
Total fat, g	30,260	1,494	28,766 g (44.7% of kcals)
Saturated fat, g	10,019	648	9,371 g (14.6% of kcals)
Cholesterol, mg	147,269	11,946	135,323 g
Dietary fiber, g	1,890	82	1,808 g

potentially consumed or discarded by midnight. Of the foods potentially consumed, 24.3% of energy was from protein (since protein provides 4 kcal/g), 29.3% of energy was from carbohydrates (since carbohydrate provides 4 kcal/g), 44.7% of energy was from total fat (since fat provides 9 kcal/g), and 14.6% of energy was from saturated fat (since saturated fat provides 9 kcal/g).

Table 3 lists the food dishes and the percent of energy they contribute to the total kilocalories prepared. The food dishes are listed in descending order of percent energy contribution, which means that Red Rice was the most abundant and available food, while Custard Pie was the least available for fiesta participants to consume. The percent of energy contribution was dependent on the amount of food that was prepared for each dish. Red Rice was served in the largest amount (22.7 kg), which explains the high percent of energy contribution. Of the 32 sources of food energy listed, 17 were *totche* (fish and meat) and provided 68% of the total energy available. Five dishes were *aggon* (starchy) and provided 24% of the total energy available. Neither *fruta* (fruits) nor *gollai* (vegetables) were important potential sources of energy at this fiesta.

When analyzed by half-cup serving size (Table 3), Roasted Pig contributed the most energy (426 kcal), total fat (40 g), and saturated fat (14 g) per serving. Chocolate Cake contributed the most carbohydrates (47 g), Eggplant with Coconut Milk contributed the most dietary fiber (2 g), and Fried Mackerel contributed the most protein (35 g).

Table 4 provides an estimate of the amount of macronutrients available to each person attending the fiesta (n=150). The amount of energy, total fat, and saturated fat available to each person for that fiesta meal was more than the recommend intakes for a whole day, and yet the amount of carbohydrates and dietary fiber available to each person was less than the recommended intakes for a day. Individuals who attended this fiesta were presented with a nutritional imbalance; they were provided with foods high in energy, fat, and saturated fat and low in carbohydrate and dietary fiber.

Discussion

CULTURAL THEMES

Two themes were reflected in this study, the availability and the variety of foods served at a fiesta. Availability, for the purpose of this study, was defined as the quantity or amount of food offered. Variety was reflected by the different kinds of dishes served. Both availability and variety were culturally influenced, to a certain extent, by *inafa'maolek* and reciprocity. Cunningham (1992) describes *inafa'maolek* as

“Interdependence ... Inafa'maolek depends on a spirit of cooperation. This is the armature, or core, that everything in Chamorro culture revolves around. It is a powerful concern for mutuality rather than individualism and private property rights.”

Inafa'maolek was observed when family members gathered to assist during the preparation of the fiesta. The men worked cooperatively to complete tasks such as cleaning coolers for beverages, setting-up the canopies and bar station, and barbecuing food. The women worked jointly in the kitchen to chop and marinate foods, cook, wash and dry food containers, and assemble the food dishes. Joint efforts through *inafa'maolek* resulted in an abundance and wide array of foods. In fact, it has been Chamorro tradition that a host prepared large amounts of food. This ensured that guests were fed and that there was left over for *balutan*, or food to go (Jorgensen 1987). However, the preparation of large amounts of food also allowed the host family an opportunity to reciprocate or repay for the labor of family members and friends provided to them throughout the duration of the event, by offering them the excess food to take home at the end of the event. This form of repayment or reciprocation for donated labor is called *a'pate* (Iyechad 2001).

Reciprocity is a mode of exchange of goods and services among social individuals, which has been a common practice in many Pacific Island societies (Hardesty 1977). Early Chamorro society was one in which social ties and overall welfare depended on a sustained social system of exchanged labor, food, and other resources among extended families (Russel 1998). Despite the change in the mode of economy from that of subsistence to a cash economy, the practice of reciprocal behavior remains very much a part of modern-day Chamorro ceremonies and rituals, including the fiesta (Iyechad 2001). In fact, a good reciprocal relationship with a person's extended family is the key to a successful family event. Furthermore, a successful event reinforces prominent social standing for family members who are fulfilling their reciprocal obligations by aiding in the preparation of the fiesta or other event (Iyechad 2001). Reciprocity was observed when friends and other extended family members presented food dishes and drinks and provided services as a form of repayment. This exchange of food dishes for past goods and services contributed to the availability and variety of foods at the fiesta.

Table 3. Nutrient content^a of the food dishes (and their % energy contribution)^b served at the fiesta.

Rank	Food Item (% total energy)	Energy (kcal)	Carbohydrate (g)	Dietary fiber (g)	Protein (g)	Total fat (g)	Saturated fat (g)
1	Rice, Red (14.02%)	104.04	21.98	0.78	1.80	0.67	0.10
2	Spareribs, BBQ (13.03%)	307.04	0.47	0.01	18.84	24.85	9.40
3	Pig, Roasted (11.92%)	426.38	0	0	15.77	39.76	14.11
4	Chicken, Fried (10.28%)	336.74	22.15	0.07	18.30	19.47	5.65
5	Steamboat (7.77%)	168.96	0	0	21.83	8.39	3.15
6	Rice, White (5.33%)	101.49	22.44	0.79	1.84	0.15	0.04
7	Chicken, Kelaguin (4.3%)	199.40	0.55	0.19	18.89	12.96	3.89
8	Fish (3.76%)	150.24	0.23	0.04	22.94	5.68	0.97
9	Chicken, BBQ (3.54%)	155.63	0.88	0.02	23.47	6.27	1.97
10	Mackerel (Atulai), Fried (2.57%)	311.28	6.13	0	35.21	16.22	4.37
11	Lumpia, Fried (2.53%)	304.18	45.57	1.50	11.66	7.72	2.92
12	Salad, Potato (2.48%)	215.82	10.58	1.26	3.78	17.37	2.67
13	Dinner Rolls ^c (1.85%)	170.40	28.63	1.70	4.77	4.15	1.0
14	Cake, Chocolate ^c (1.43%)	271.72	46.85	1.94	6.49	6.61	2.14
15	Fritâda, Pig (1.42%)	167.39	0.38	0.06	17.47	10.09	3.59
16	Pancit (1.35%)	211.43	19.28	1.36	4.57	12.87	3.85
17	Tamâles Gisu (1.34%)	254.47	43.01	0.77	6.62	6.15	1.09
18	Dried Meat (Tinala' Kâtne) (1.29%)	204.77	2.84	0.62	32.46	6.37	2.03
19	Coleslaw (1.20%)	284.87	7.85	1.60	0.98	27.86	3.80
20	Shrimp Patties (1.14%)	123.75	16.58	1.99	10.13	1.72	0.56
21	Chicken, Soup with Corn (1.14%)	61.52	5.15	0.53	2.99	3.56	1.85
22	Mackerel (Atulai), Kelaguin (1.12%)	212.44	2.35	0.46	25.31	10.66	3.53
23	Fritâda, Deer (1.08%)	130.18	0.29	0.06	24.71	2.61	1.02
24	Cake, Cassava (0.91%)	220.60	37.00	1.37	1.35	8.32	7.10

25	Skipjack (I'e'), Kelaguin (0.82%)	111.44	1.35	0.34	21.27	1.87	1.11
26	Fina'dene, Soy Sauce (0.73%)	81.04	13.08	2.05	7.69	0.23	0.03
27	Eggplant in Coconut Milk (0.59%)	66.19	6.40	2.13	1.37	4.67	4.03
28	Sa'sime' (0.43%)	163.30	0	0	26.46	5.56	1.43
29	Salad, Fruit (0.30%)	141.38	22.30	0.69	0	4.36	4.36
30	Kimchee (0.06%)	18.04	4.09	1.58	0.83	0.10	0.03
31	Fina'dene, Lemon (0.05%)	59.50	15.19	2.11	2.34	0.23	0.03
32	Pie, Custard ^c (0.05%)	220.50	21.84	1.68	5.78	12.18	2.47

^aPer ½-cup serving in grams (or kcal for energy) for prepared dishes except pie, chocolate cake, and dinner roll.

^bDoes not add to 100% due to rounding.

^cPer 1/8 slice of pie, 1/12 slice of cake, or piece of dinner roll in grams (or kcal for energy).

Table 4. Nutrients available for consumption by the estimated 150 individuals who attended the fiesta. Estimated nutrient consumption is compared to U.S. Recommendations

	Nutrients Available at Fiesta Per Person (n=150)	U.S. Recommendations	
		Females	Males
Kilocalories ^a	3858 kcal	1800 kcals/day	2400 kcals/day
Protein ^b	24.3% kcals	10-35% kcals	10-35% kcals
Carbohydrates ^b	29.3% kcals	45-65% kcals	45-65% kcals
Total Fat ^b	44.7% kcals	20-35% kcals	20-35% kcals
Saturated Fat ^b	14.6% kcals	< 10% kcals	< 10% kcals
Dietary Fiber ^c	12 g	21-25 g/day	30-38 g/day

^a Recommendations are based on the Estimated Energy Requirement values from Dietary Reference Intakes (IOM, 2002) for 30-year-old sedentary women and men assuming the following. Women: mean height of 1.5 m and mean weight of 66 kg. Men: mean height of 1.7 m and mean weight of 79.5 kg.

^b Recommendations are based on the Acceptable Macronutrient Distribution Range values from Dietary Reference Intakes (IOM, 2002).

^c Recommendations are based on the Adequate Intake values from Dietary Reference Intakes (IOM, 2002).

DIETARY PATTERNS

While there was an abundance of food dishes, the diversity of the dishes was not nutritionally balanced. Of all the foods served at this fiesta, more than half (18 dishes) were *totche* (fish and meat) and few were vegetable and fruit dishes. Individuals attending this fiesta had ample opportunity to consume foods high in energy, fat, and saturated fat. Plant-based foods that are high in dietary fiber and low in energy and fat were limited. Assuming that this fiesta is typical of fiestas held in Guam on a regular basis, Guam residents have the potential to consume great quantities of food that are high in energy and fat, and low in dietary fiber and other essential nutrients.

Unlike the Chamorro diet prior to European colonization, which consisted primarily of plant foods and had seafood as the main source of protein (Cunningham 1992), the foods served at this fiesta reflected the Chamorro islander's shift away from traditional agriculture. Today, less than 1% of the population on Guam now farms for food, so the majority relies heavily on imported goods (Bamba 2003). For most developing islands in the Pacific region, traditional foods such as taro, breadfruit, sweet potato, fruits and vegetables have been replaced by energy-dense foods (Pacific Magazine 2002). Foods for this fiesta were predominantly imported, with the exception of all fish dishes and locally raised or caught deer and pig, which were introduced since the early Spanish period. Chickens are also historically transplanted animals that are raised

locally for consumption. Although all chicken dishes used at this fiesta were imported many residents may use locally raised chickens in their food dishes. Traditional foods like breadfruit, taro, and yams were not served at this fiesta.

For many of the food dishes, it was the addition of ingredients and cooking method that contributed to the high energy and total fat values. For example, the Fried Chicken was seasoned and buttered prior to deep-frying. Eliminating the buttering process and changing the cooking method would have reduced the energy and fat content of Fried Chicken. Slight modifications to other dishes would have also reduced energy and fat, and increased the dietary fiber content. For example, the Coleslaw at this fiesta was made with mayonnaise. A more nutritional dish would have been the Chamorro Coleslaw, which is made with vinegar. Substituting mayonnaise with vinegar and adding more cabbage (red and green) would have greatly reduced the energy and fat content, and increased the dietary fiber content of this dish. Additionally, the Red Rice was a significant source of carbohydrate, but it was low in fiber. The use of brown instead of white rice, and the addition of vegetables, such as green peas, would have supplied the dish with more dietary fiber and important vitamins and minerals. For future events, many fiesta food dishes could be modified so that they are lower in energy and fat, and higher in dietary fiber and other essential nutrients.

LIMITATIONS

Several limitations influenced the interpretation of results in this study. First, the availability and variety of foods were reflective of a single fiesta and may differ from other fiestas. Some villages may serve more traditional dishes than others. Second, food losses and *balutan* were difficult to measure. They were not accounted for during preparation and potential consumption. Finally, beverages were not included in the nutritional analysis because of discrepancies in beverage counts. As a result, energy and nutrient values were underestimated. Some of the beverages available at this fiesta included domestic beer (regular and light), sodas (regular and diet), hard liquor, and non-carbonated sweetened drinks, all of which would have increased energy (kcalories) availability at this fiesta.

Despite these limitations, this study is the first to formally describe food dishes and nutrient content of foods prepared and potentially consumed at a fiesta. Further research is needed to capture usual fiesta food intake by fiesta-goers on Guam.

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