Nutrición Hospitalaria

Trabajo Original

Nutritional assessment of the most frequently consumed dishes in a slum in Iquitos, Peruvian Amazon

Valoración nutricional de los platos más frecuentemente consumidos en un barrio marginal de Iquitos, Amazonía Peruana

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Abstract

Introduction: Large nutritional surveys in Peru have identified the magnitude and location of the different types of malnutrition. The chronic type is the most prevalent one. However, although rates may be considered as alarming (even more in rural areas), only one of these studies contains information about intake characteristics, using 24-hour recalls (R24). That is, it lacks some other systems, adapted to the gastronomical characteristics of their regions and to the bioavailability of food in each area, in order to locate the origin of this situation and, thus, propose truly effective and efficient solutions.

Aim: To determine the nutritional value of the main dishes consumed by the residents of a slum in Peruvian Amazon.

Methods: Ninety-eight participants completed three 24-h recalls. Based on these data, we selected the 25 most commonly eaten dishes and evaluated their nutritional composition. We took note of the homemade recipes, weights and measures. In addition, we observed preparation and cooking. The mean nutritional composition of each dish was calculated per 100 g using the Nutriplato 4.6. software. We also calculated gains or losses resulting from culinary treatments.

Results: Within those which include milk, the highest energy density is the *mingado de arroz*. In the group of fish, the most energetic is *pescado frito*, while within meat-based recipes *tallarín con pollo, res asada* and *chancho frito* are the most energetic ones. Regarding prepared dishes, the *juane* is the highest energy density of all recipes. Inside garnish, using bananas as the main ingredient, *plátano frito* and *madurito* are the most energetic. Fats are higher in fried dishes and those which contribute most fat ratio. The same thing happens with garnish as 100 grams of *plátano frito* or *madurito* contain more than 70% of the RDA. *Res asada* and *juane* present the highest sodium level.

Conclusions: If we wish to offer healthier dishes, it is necessary to change their composition and/or cooking methods, reducing the consumption of fried foods. Sodium intake should also be reduced. Two foods could be important to that aim: *menudencia de pollo*, rich in B vitamins and low in fat, and *frijol hervido*, which is rich in vegetable protein and, with rice dishes ubiquitous in this area, increases the biological value of ingested proteins.

Resumen

Introducción: un gran número de encuestas nutricionales en Perú han identificado la magnitud y la ubicación de los diferentes tipos de desnutrición, siendo la forma crónica la más prevalente. Sin embargo, aunque las tasas pueden considerarse alarmantes (aún más en las zonas rurales), sólo un trabajo contiene información sobre las características de la ingesta, usando recordatorios de 24 horas (R24). Es decir, se carece de otros sistemas de estudio centrados en conocer las características gastronómicas de sus regiones y la biodisponibilidad de los alimentos, con el fin de localizar el origen de esta situación en cada área y proponer soluciones verdaderamente eficaces y eficientes.

Objetivo: determinar el valor nutricional de los platos principales consumidos por los residentes de un barrio pobre de la Amazonía Peruana, para identificar las causas de la pérdida de un estado nutricional saludable.

Métodos: noventa y ocho participantes completaron tres R24. Basándonos en estos datos, se seleccionaron los 25 platos más comúnmente consumidos y evaluamos su composición nutricional. Tomamos nota de las recetas, pesos y medidas caseras. Además, se observó la preparación y cocción. La composición nutricional media de cada plato se calculó por 100 g utilizando el software Nutriplato 4.6. También se calcularon las ganancias o pérdidas derivadas de los tratamientos culinarios.

Resultados: dentro de los platos basados en la leche, el de más alta densidad de energía es el mingado de arroz. En el grupo de los pescados, la mayor cantidad de energía es aportada por el pescado frito, mientras que en las recetas a base de carne, las más energéticas son el tallarín con pollo, la res asada y el cerdo frito. Como platos preparados, el juane tiene la más alta densidad de energía de todas las recetas. Dentro de las guarniciones, aquellas que utilizan los plátanos como el ingrediente principal, el plátano frito y el madurito, son las más energéticas. Las grasas son más elevadas en los platos fritos y son estos platos los que más contribuyen al porcentaje total de grasa consumida. Lo mismo ocurre en las guarniciones, donde 100 g de plátano frito o madurito contienen más del 70% de la dosis diaria recomendada. La res asada y el juane tienen el nivel más alto de sodio.

Conclusiones: si se desea ofrecer platos más saludables, es necesario cambiar algunos hábitos alimenticios, lo que supone reducir el consumo de alimentos fritos porque probablemente está relacionado con la obesidad y otras enfermedades crónicas cardiovasculares. También se debe reducir la ingesta de sodio. Dos alimentos que podrían ser importantes son la menudencia de pollo, rica en vitaminas del grupo B y baja en grasas, y el frijol hervido, rico en proteínas vegetales, que con platos de arroz, omnipresentes en esta área, incrementaría el valor biológico de las proteínas ingeridas.

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INTRODUCTION

It is considered that a diet is healthy when it promotes good health and reduces the risk of chronic diseases related to it. Today, the clear link between food, health maintenance and development of chronic diseases has been proved. In this respect, it is known that many of the current causes of mortality are closely associated with preventable risk factors such as an unbalanced diet, obesity, a sedentary lifestyle, smoking and alcohol consumption (1).

Large nutritional surveys (2-7) in Peru have identified the magnitude and location of the different types of malnutrition. The chronic type is the most prevalent. However, although rates may be considered to be alarming (even more in rural areas), only one of these studies (6) contains information about intake characteristics, using 24-hour recalls (R24). That is, it lacks some other systems, adapted to the gastronomical characteristics of their regions and to the bioavailability of food, in order to locate the origin of this situation and, thus, propose truly effective and efficient solutions.

The Department of Loreto (Peru) is the largest territory in the Peruvian Amazon with an area of 128,333 km². Iquitos is the capital, located on the banks of the Amazon River, the longest river in the world, and it represents the last port of the Atlantic. The city depends on forest and aquatic ecosystems in their environment for food, health, housing and tourism.

The Analysis of the Health Situation of Loreto (2007) (8) indicates that at the stage of age called "senior" the main causes of death were pneumonia (13.4%), followed by primary hypertension (7.4%) and diabetes mellitus (4.5%). Overall, there is predominance of infections, but in relation to previous years a greater presence of chronic degenerative diseases is detected. Deaths linked to protein-calorie malnutrition in this age group account for 2.7%. In addition, other papers report that deaths from protein-energy malnutrition in children account for only 4.7%. However, the main causes of mortality in this age group are acute respiratory infections and sepsis, disease states clearly linked to malnutrition (9).

However, as Bendayán stated (10), the problem in the way people from the Peruvian Amazon feed on was introduced from the arrival of the Spanish conquers, who changed eating habits and introduced processed foods, canned and excessive consumption of simple sugars. Meanwhile, people forgot regional products and their preparation methods. Gathering, hunting, fishing and agriculture are livelihoods so far traditionally used to prepare a variety of foods that form a culture that unfortunately is being forgotten.

In the last 10 years, the caloric intake of protein in Loreto was 1,800 calories/day per person, and it is kept up until nowadays (11). This fact indicates that, continuously, population in this department has not been eating properly, consuming low levels of calories and proteins. However, this situation is in contrast with fish fauna of the Amazon Basin, considered as the richest in the world, with more than 700 identified species (12), which is currently exploited for self-sufficiency and marketing. For these reasons, this malnutrition is related to the lack of food culture coupled with low purchasing power (11). Due to the influence of diet on the prevention, development, treatment and evolution of diseases, it is vital to have a good knowledge of the food habits of this population (13).

Therefore, the present study aims to know the nutritional value of the commonly eaten dishes in Loreto.

METHODS

The study was conducted between July and November 2012 in the Belén district, in Iquitos, particularly in Pueblo Libre, a neighborhood located in peri-urban areas that suffer that suffer flooding between February and June. This location makes its inhabitants exhibit characteristics of transition between communities near the rivers of the jungle and the city itself. It is divided in different sectors. Sector 12 was selected for this study in order to represent this transition clearly, making the extrapolation of results to the rest of urban communities and those living in the jungle more likely.

The minimum sample size for mapping the nutritional status of this slum was estimated according to population data (900 individuals) in Sector 12 of Pueblo Libre, consulted in the last census of 2009 (14), with an expected desnutrition frequency of 24.9% (6) and a confidence level of 95%, getting a sample size of 227 individuals. From 40 families randomly chosen, we selected 227 participants by keeping the same age and sex structure as the census. 98 of 227 individuals were chosen to complete three 24-hour recalls (R24), two on weekdays and one on a holiday. That was how we identified the 25 most commonly consumed dishes to assess their nutritional composition. Through various interviews conducted by a trained nutritionist, the recipes were taken, as well as homemade weights and measures. In addition, we observed the preparation and cooking of each one. Protocols for data collection were similar to those of other recipes assessment studies (15-18). We interviewed four women per each recipe in order to identify differences in the amount of ingredients. The amount of ingredients used for the nutritional assessment of each dish represents the average of variations obtained from the same recipe, according to people interviewed.

Nutriplato 4.6 software (19) was used for nutritional assessment of dishes, updated for food consumed in the Peruvian Amazon. This update was made with the FAO/ LATINFOODS table (20). Since biochemical analysis was expensive in terms of resources, time and expense (there were no local analytical laboratories and samples preservation was really complex), we opted for this methodology whose results were validated (17,18,21-23). Recipes were valued for 100 g of edible portion, and yield and retention factors from various culinary treatments such as roast, cooked or fried in oil were taken into account (22,23). To determine the measures of central tendency and dispersion we used IBM SPSS STATISTICS 19.0 (IBM, Arkmon, NY, USA).

The results were collected and classified according to valued nutrients. Energy was expressed in Kcal, while macronutrients like carbohydrates, protein and fat were measured in grams. The amount of vitamins A and B9 was reflected in micrograms. Levels of vitamins C, B1, B12 and B6 were expressed in milligrams. Micronutrients like sodium, potassium, iron, calcium and phosphorus were measured in milligrams. All results were compared

with the Recommended Dietary Allowance (RDA) for Latin America according to ILSI (International Life Sciences Institute) (24).

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the University of Cordoba and Asociación La Restinga. Verbal informed consent was obtained from all subjects. Verbal consent was witnessed and formally recorded.

RESULTS

These 25 recipes have been classified into five groups: 3 as milk based recipes, 8 as fish recipes, 9 as poultry dishes, 3 recipes with meat and 2 as prepared foods. These latter correspond to two ready-made dishes that were bought in the Belen market. We also collected information on the conformation of the dish, that is, we indicated which food is served as a garnish for each recipe. We decided to do this because in this area it is common to serve food always accompanied with garnishes such as rice, bananas and/or various types of legumes whose nutritional value is important. All this information is presented in table I.

We also sought to organize recipes by time of intake (breakfast, lunch, meal time or dinner), but it was impossible because there was not an obvious feeding pattern where we could see what time each food was consumed. All dishes were consumed at different times of the day, as we saw in the R24.

Table II includes a summary of the meals (combinations of dishes and garnishes) that were most frequently found in 24h-recalls and the average of grams for each of them. Highlights include *pescado frito* accompanied by *arroz hervido* and *plátano frito*; *pescado asado* served with *plátano asado* and *tallarín con pollo* with *arroz hervido* and *madurito*.

Another important aspect is that the most consumed meals are generally those who have higher energy density and provide a very high proportion of the RDA for lipids. For example, *pescado frito* with *arroz hervido* and *plátano frito* represents 119.3% of the RDA for lipids; *tallarín con pollo* served with *arroz hervido* y *madurito*, 113.4%, and *juane* (which appears 17 times), 163.3% of the RDA for lipids.

The results of the global nutritional assessment of the dishes and garnishes are reflected in tables III and IV. RDA percentage is shown in figures 1, 2, 3 and 4.

As far as milk-based recipes are concerned, the highest energy density comes from the *mingado de arroz*. In the group of fish dishes, the greatest amount of energy is found in *pescado frito*, while in meat-based recipes *tallarín con pollo* and *chancho frito* are outstanding. With respect to prepared dishes, we highlight *juane*, which has the highest energy density of all dishes. Garnishes which include banana as the main ingredient (*plátano verde frito* and *madurito*) are those which offer more kilocalories.

Recipes that provide more carbohydrates are *pescado frito*, *arroz mingado* and *arroz chaufa*, in that order. Regarding garnishes, *frijol hervido* along with *plátano asado* are the principal source of carbs.

In relation to proteins in recipes, *res asada* and *pollo frito* stand out as having the highest proportion of this nutrient. Among garnishes, *frijol hervido* and *huevo frito* showed more protein content.

The study of lipids demonstrated that *juane* is the main source of fats, although fried recipes like *chancho frito* and *pollo frito* must be highlighted as well. The same goes for garnishes, where 100 grams of fried banana and/or "older man" are those which contain more total fats.

The dishes where we found more sodium were *res asada* and *juane*, with numbers representing, respectively, 40.7% and 24.65% of the RDA (Fig. 1). Because of their high iron content, recipes that include chicken giblets are worthy of special mention. *Pango de pescado* and *arroz chaufa* have the highest levels of potassium. Recipes based on fish, including bones, are the main source of calcium. Phosphorus-rich recipes are those chicken based (*pollo frito* or *pollo broster*) and *chicharrón de pescado*. Among garnishes, *frijol hervido* is characterized by low sodium and provides large amounts of potassium, iron, calcium and phosphorus (Fig. 2), which makes it a garnish that could be helpful to alleviate nutritional deficiencies regarding micronutrients of these most consumed dishes.

In addition, *sopa de menudencia* (Fig. 3) is the dish that brings more vitamin A (40% RDA), followed by *quaker de leche* (35.8% RDA). On the other hand, *ceviche* and *pango de pescado* are the most important sources of vitamin C in this population. In relation to the amounts of vitamin B9, we find again giblets, in the form of soup or fried, which present higher levels of this nutrient. The most frequently consumed dishes based on fish, as *chilicano de palometa* and *chicharrón de pescado* were the main source of vitamin B12, while fried pork, *quaker de leche* and *pescado asado* stood out as a vitamin B1 source. *Pollo frito* and *pando de pescado* also provide significant amounts of vitamin B6 (31% and 27% RDA, respectively) (Fig. 3). Regarding garnish (Fig. 4), *yuca cocida* deserves special mention due to its high content of vitamins A and B9, as well as *plátano asado* for its concentration of vitamins C and B6, *huevo frito* for the amount of B12 it provides, and *frijol hervido* for the ratio of B1 it contains.

Finally, in relation to the energy profile of nutrients (Fig. 5), it must be noted that, overall, these dishes have an excessive level of fats and a low protein level. This lipid imbalance becomes more extreme in the most calorie-dense dishes. There is more variability in carbohydrates proportion, having found recipes where they are virtually non-existent and other dishes where they represent the primary energy input.

DISCUSSION

The nutritional profile of the dishes most frequently consumed by the population of the study indicates certain similarities to other studies (17,18,21,25-27) which valued the most popular recipes in communities belonging to developing countries. Dishes have common nutritional values defined by a high energy density and high content in fat. This occurs because most of the dishes or their garnishes have a fried preparation. In addition to

Table I. Description of the commonly consumed dishes and garnishes (superscript)

	Dish	Brief description and ingredients
With milk	*Mingado or mazamorra de arroz*	Boiled rice with milk: Water, rice, evaporated milk and sugar
	Mingado de plátano	Banana shredded and boiled with milk: Banana flour, water, evaporated milk, cinnamon and sugar
	Quaker con leche	Oat flakes with milk: Oats, evaporated milk, water, sugar and cinnamon
Fish dishes	*Sudado de pescado*[1]	Fish stew: Fish, garlic, onion, vegetable oil, tomato, cilantro, food coloring, salt and *ajinomoto* (flavor enhancer)
	Pescado frito[1, 2, 3 or 4]	Fish fried: Fish, vegetable oil, garlic, black pepper, vinegar, wheat flour and *ajinomoto*
	Chicharrón de pescado[1, 2, 3 or 4]	Fish fried in lard: Fish, lard, garlic, black pepper, vinegar, wheat flour and *ajinomoto*
	Cebiche[5]	Raw fish marinated in lemon: Fish, lemon juice, black pepper, garlic, red onions and roasted corn
	Mazamorra de pescado[1]	Fish cooked with banana: Fish, water, garlic, green banana, fish broth tablet, salt and *ajinomoto*
	Pango de pescado[1]	Fish cooked with banana: Fish, green bananas or yucca, garlic, cilantro, salt and *ajinomoto*
	Pescado asado[1, 3, 4 or 6]	Grilled fish: Fish, garlic, tomato, sweet pepper, salt, banana leaf and *ajinomoto*
	Chilicano de palometa[1, 3 or 7]	Baked pomfret into small strips: Pomfret, water, salt, garlic, *ajinomoto* and cilantro
Poultry dishes	*Pollo broster*[1, 2, 3 or 4]	Broaster chicken: Skinless chicken, vegetable oil, garlic, vinegar, soya sauce, *ajinomoto*, wheat flour and salt
	Tallarín con pollo[1, 3, 4 or 8]	Chicken noodle: Noodles, vegetable oil, poultry with skin, soya sauce, vinegar, salt, tomato, food coloring and chicken broth tablet
	Pollo asado[1, 3, 4 or 6]	Roast chicken: Chicken with skin, soya sauce, vinegar, vegetable oil, salt, tomatoes and chicken broth tablet
	Arroz con pollo	Chicken rice: Chicken with skin, vegetable oil, rice, salt, tomato, carrot, pea pods, water, soya sauce, vinegar, food coloring and chicken broth tablet
	Pollo frito[1, 2, 3 or 4]	Fried chicken: Skinless chicken, vegetable oil, garlic, vinegar, soy sauce, *ajinomoto* and salt
	Picante de menudencia	Fried giblets: Giblets chicken, garlic, soya sauce, vinegar, bay leaf, chicken broth tablet, *ajinomoto*, vegetable oil, water, rice, cilantro and salt
	Sopa de menudencia	Giblet soup: Chicken Giblets, water, garlic, corn, corn, carrot, turnip, peas pods, noodles, chicken broth tablet, *ajinomoto* and salt
	Pollo con papas[1]	Chicken with potatoes: Chicken with skin, potatoes, vegetable oil, tomatoes, peas, carrots, water, soya sauce, vinegar, salt, color, chicken broth tablet
	Caldo de gallina[1]	Chicken Soup: Chicken, water, salt, garlic, corn, carrot, turnip, pea pods, yucca, chicken broth tablet, *ajinomoto*
Meat dishes	*Sopa de res*[1]	Beef soup: water, garlic, salt, beef, beef bone, carrots, corn, tomato, ginger, noodles, *ajinomoto*, beef bouillon tablet
	Res asada[1, 2, 3 or 4]	Roast beef: Beef, soya sauce, vinegar, vegetable oil, salt, tomatoes and chicken broth tablet
	Chancho frito	Fried pork: Pork (lean), garlic, vinegar, soya sauce, *ajinomoto*, salt and vegetable oil
Ready-made dishes	*Juane*[8]	Rice ball with chicken and olives wrapped in banana leaf: Chicken, vegetable oil, rice, salt, *ajinomoto*, tablet chicken broth, chicken egg, olive and banana leaf
	Arroz chaufa[8, 9]	Fried rice: Water, rice, garlic, soya sauce, vegetable oil, *ajinomoto*, broth tablets, Chinese onion and salt

Garnishes:

[1] *Boiled rice (150 g): white rice, water, vegetable oil, garlic and salt.*

[2] *Fried green banana (30 g): green banana, vegetable oil and salt.*

[3] *Boiled beans or peas (30 g): beans or peas, salt and water.*

[4] *Cucumber salad, seasonal (20 g): cucumber, lemon juice and salt.*

[5] *Boiled yucca and/or yams (100 g): yucca and/or yams, water and salt.*

[6] *Roasted green banana (40 g): green bananas.*

[7] *Cooked green banana (40 g) green banana, water and salt.*

[8] *Fried ripe banana (40 g): ripe banana, vegetable oil and salt.*

[9] *Fried egg (65 g): chicken egg, vegetable oil and salt.*

Table II. More frequent meals (combinations of dishes + garnishes) in R24

| Meals (dishes + garnishes)	Average amount (g)	Energy RDA (%)	Carbs RDA (%)	Proteins RDA (%)	Lipids RDA (%)	Number of appearances in 24-R
Mingado de arroz	326 ± 139.3	26.3	36.6	17.1	10.1	20
Mingado de plátano	250	10.1	11.5	9.8	8.7	28
Quaker con leche	310 ± 19.4	10.9	9.6	13.4	13.4	25
Sudado de pescado/arroz hervido/plátano sancochado	228 ± 124.9/126.7 ± 47.5/47.7 ± 19.3	41.1	24	34.5	93.3	15
Pescado frito/arroz hervido/plátano frito	140.5 ± 43.1/126.7 ± 47.5/36.9 ± 9.7	46.1	21.9	28.5	119.3	63
Pango de pescado/arroz hervido	200 ± 4/126.7 ± 47.5	29.1	22.5	21.6	54.2	3
Pescado asado/plátano asado	155.2 ± 47/41.7 ± 12.5	24.1	17	29.4	42.2	57
Chilicano de palometa	240 ± 80	7	0.6	34.7	10	5
Pollo broster/arroz hervido/ensalada de pepino	135 ± 15/136.7 ± 47.5/31.3 ± 10.4	21.3	9.1	44.1	41.4	2
Tallarín con pollo/arroz hervido/madurito	196.5 ± 82.4/126.7 ± 47.5/45.2 ± 14.3	46.8	21.5	47.7	113.4	20
Pollo asado/arroz hervido/plátano asado	147.3 ± 45.1/126.7 ± 47.5/41.7 ± 12.5	22.8	9	41	46.5	8
Arroz con pollo	286.4 ± 22.3	14.5	16.1	31.5	84.7	22
Pollo frito/arroz hervido/ensalada de pepino	184.1 ± 66.4/126.7 ± 47.5/31.3 ± 10.4	31.2	6.2	53.6	80.5	10
Picante de menudencia/arroz hervido/plátano frito	143.9 ± 39.2/126.7 ± 47.5/36.9 ± 9.7	26.7	12.7	7.7	90.4	21
Sopa de menudencia	177.8 ± 41.6	3.3	2.9	5.9	3.3	9
Pollo con papas/arroz hervido/plátano frito	276.3 ± 100.5/126.7 ± 47.5/36.9 ± 9.7	31.7	13.8	22.7	83.6	8
Sopa de res	375 ± 125	15.8	6.4	54.4	20.5	2
Res asada/arroz hervido/ensalada de pepino/yuca hervida	104.3 ± 21.3	25.2	9.8	44.1	56.5	5
Chancho frito/arroz hervido/ensalada de pepino/frijol hervido	80/126.7 ± 47.5/31.3 ± 10.4/55.9 ± 25.1	26.1	17.4	40.1	73.6	4
Juane	300	60.2	25	40.2	163.3	17
Arroz chaufa/huevo frito	242.3 ± 138.5/71.2 ± 13.3	28.7	29.4	29.6	30.9	14

the high-energy intake that this implies, and its influence on the development of obesity, it is noteworthy that the composition of the oils which are used is unknown. In some cases in which we could identify their composition, oils were of very low nutritional quality (palm, cotton, coconut and/or a mixture of several). This situation is due to the fact that these products are cheaper and, therefore, more accessible for these people who have a very low income.

Sodium excess in dishes is also similar to that found in other studies (17,18,21). For residents in Pueblo Libre this is related to the fact that many of the dishes are spiced not only with salt but also with Siyao (soy sauce), rich in monosodium glutamate (MSG) and containing a flavor enhancer, Ajinomoto, which is also MSG.

On the other hand, high carbohydrate consumption is remarkable because almost all garnishes accompanying the dishes are made with rice and bananas. Nor can we forget about the low-pro-

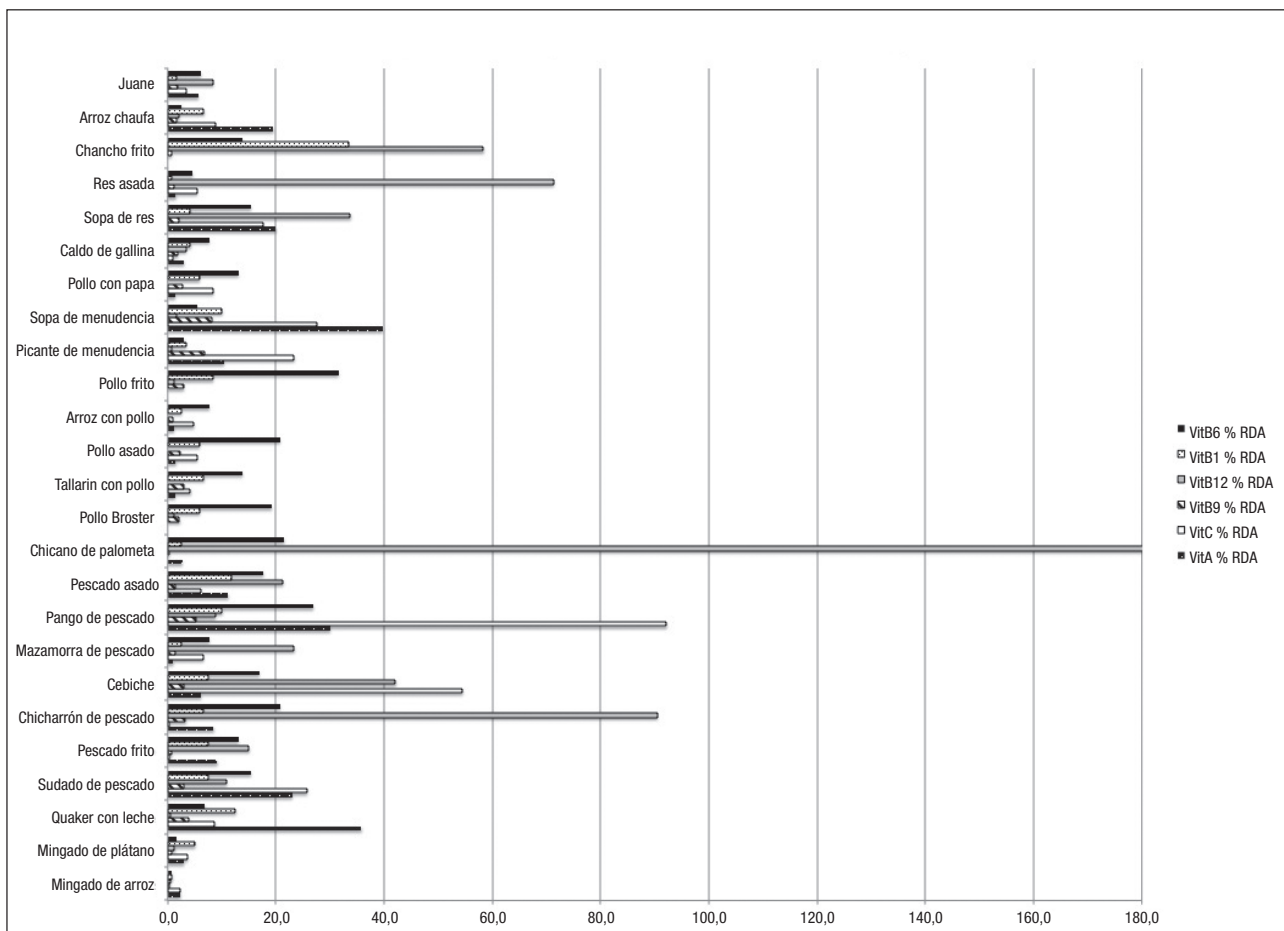**Table III.** Energy, macronutrient and micronutrient for each recipe

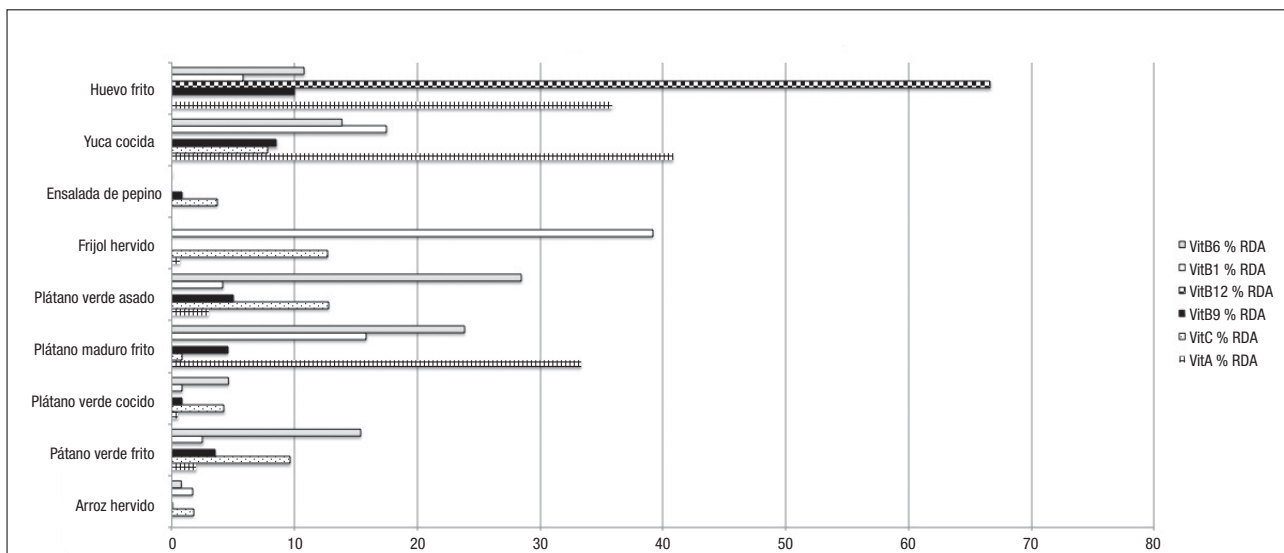| Recipe	Kcal	Carbohydrate (g)	Protein (g)	Fat (g)	Na (mg)	K (mg)	Fe (mg)	Ca (mg)	P (mg)	Vit A (µg)	Vit C (mg)	Vit B9 (µg)	Vit B12 (µg)	Vit B1 (mg)	Vit B6 (mg)
Mingado de arroz	207	27.7	2.2	10.5	334	206	0.3	41.7	56	14	1	1.2	< 0.1	< 0.1	< 0.1
Mingado de plátano	81	14.5	2.4	1.9	36	81	0.3	48.8	64	18	0.2	2.7	< 0.1	0.7	< 0.1
Quaker con leche	71	9.8	2.7	1.4	30	258	1.3	70.3	85	215	3.9	15.6	< 0.1	0.1	0.1
Sudado de pescado	253	23.9	8.6	14.9	276	196	1.6	137.8	67	138	11	11.6	0.3	0.1	0.2
Pescado frito	348.7	31.1	11.1	20.7	373	96	1.2	153.7	68	55	0.1	2.7	0.4	0.1	0.1
Chicharrón de pescado	175	2.1	15.6	11.2	49	307	0.4	14.7	182	51	0.1	13.1	2.2	0.1	0.3
Ceviche	78	5.6	8.5	2.5	28	227	0.9	48.3	103	37	23.6	12.2	1	0.1	0.2
Mazamorra de pescado	79	4.8	7.4	3.5	241	118	0.9	6.5	37	6	2.9	5.3	0.6	< 0.1	0.1
Pango de pescado	172	25.7	5.8	6.2	149	372	1.9	93.6	54	180	41.5	20.9	0.2	0.1	0.3
Pescado asado	284	28.1	11.5	14.7	367	132	1.3	149.9	66	67	2.7	5.7	0.5	0.1	0.2
Chilcano de palometa	59	0.8	9.1	2.2	53	193	0.3	12.9	110	16	0	0.8	4.4	< 0.1	0.3
Pollo broster	175	3.6	17.2	9.9	35.8	175	0.7	8.6	151	0	0	5.6	0	0.1	0.2
Tallarín con pollo	255	20.8	13.1	13.7	43	223	1	13.7	142	8	1.9	12.3	0	0.1	0.2
Pollo asado	211	0.8	15.2	16.3	64	249	0.7	10.2	141	9	2.4	9.4	0	0.1	0.3
Arroz con pollo	241	17.8	6.9	16.3	342	259	0.9	12.1	84	7	2.1	3.7	0	< 0.1	0.1
Pollo frito	169.7	0.3	18.5	10.4	73.5	291.7	0.7	10.0	179.4	0	0	11.6	< 0.1	0.1	0.4
Picante de menudencia	96	9.7	1.8	5.9	122	166	3	68.3	37	62	10.5	27	< 0.1	< 0.1	< 0.1
Sopa de menudencia	37	5.1	2.1	1	91	177	3	74.2	45	238	12.4	33.1	< 0.1	0.1	0.1
Pollo con papa	86	6.3	4.4	5	19	162	0.7	6.5	48	8	3.8	11	0	0.1	0.2
Caldo de gallina	101	4.4	6.2	6.6	19	55	1.3	12.3	52	18	0.4	7.1	0.1	< 0.1	0.1
Sopa de res	84	5.4	9.1	3	234	175	1.6	11.7	21	120	7.9	8.4	0.8	< 0.1	0.2
Res asada	200	0.8	23.1	11.6	814	145	2.6	13.5	107	9	2.4	4.3	1.7	< 0.1	0.1
Chancho frito	311	0.6	14	27.9	438	260	1.1	7.1	134	0	0	2.5	1.4	0.4	0.2
Arroz chaufa	262	27.5	2.4	16.6	437	332	0.7	20.8	59	117	4	6.7	< 0.1	0.1	< 0.1
Juane	401	26.3	8.4	29.9	493	265	1.2	23.7	84	34	1.5	7.1	0.2	< 0.1	0.1
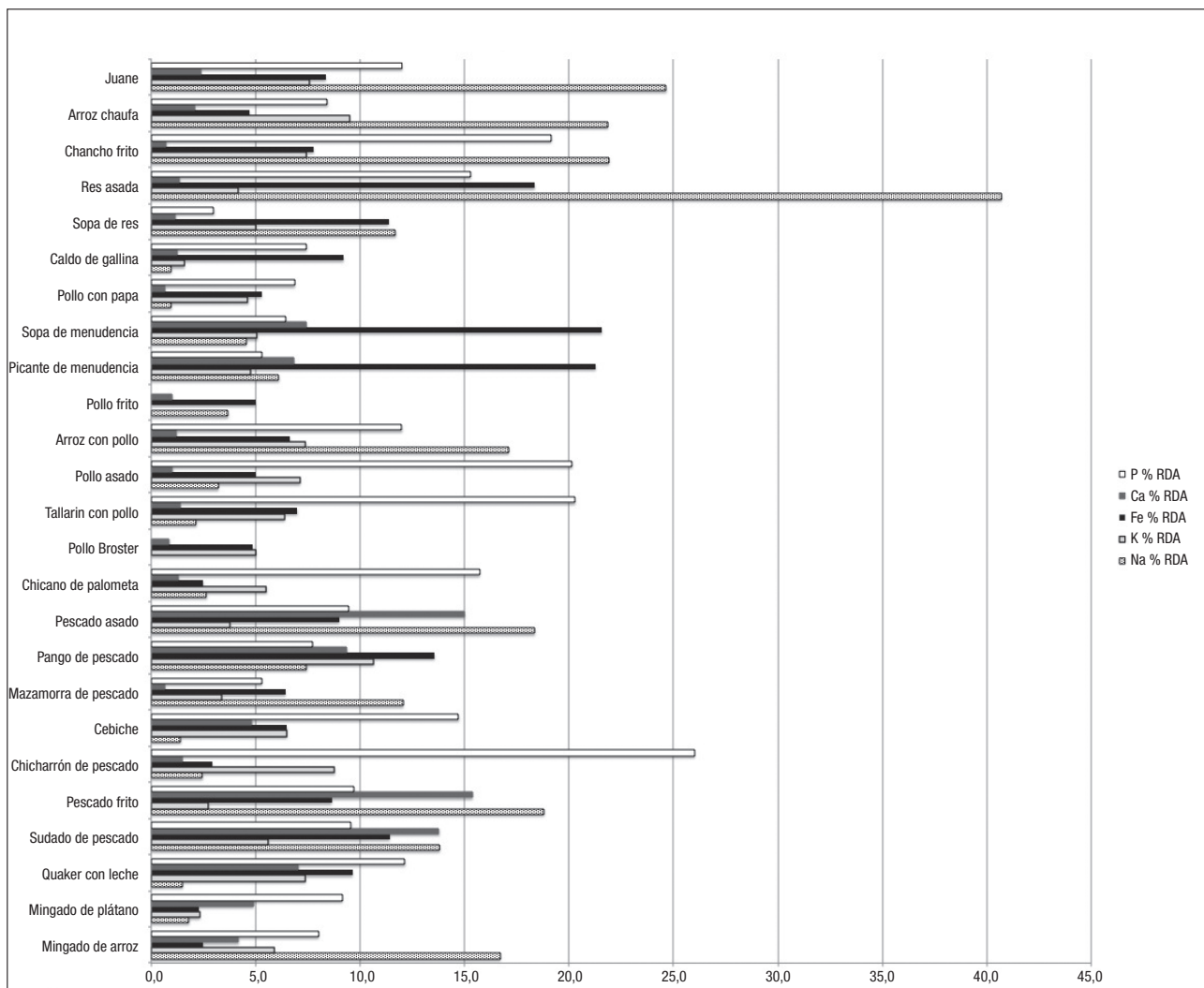
Figure 1.

Percentage of the RDA of micronutrients for each recipe.
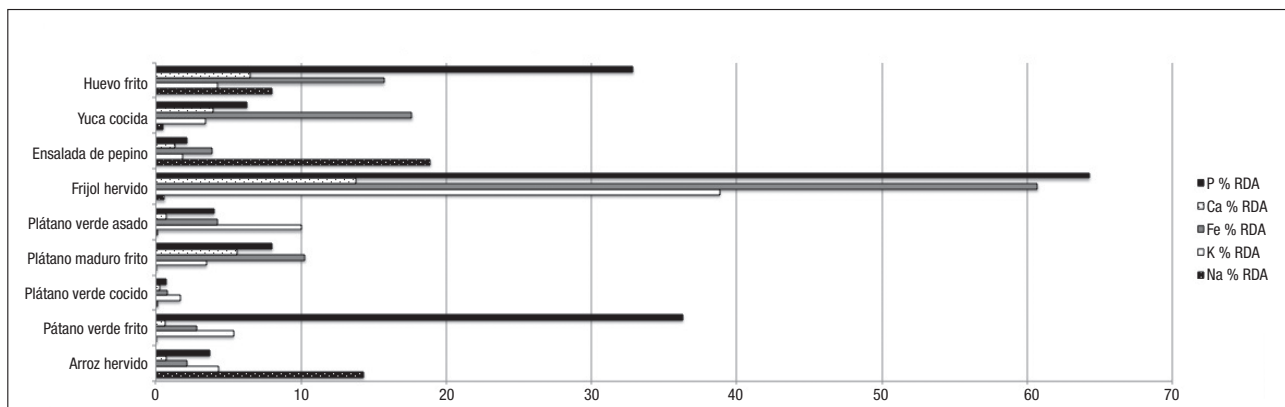
Figure 2.

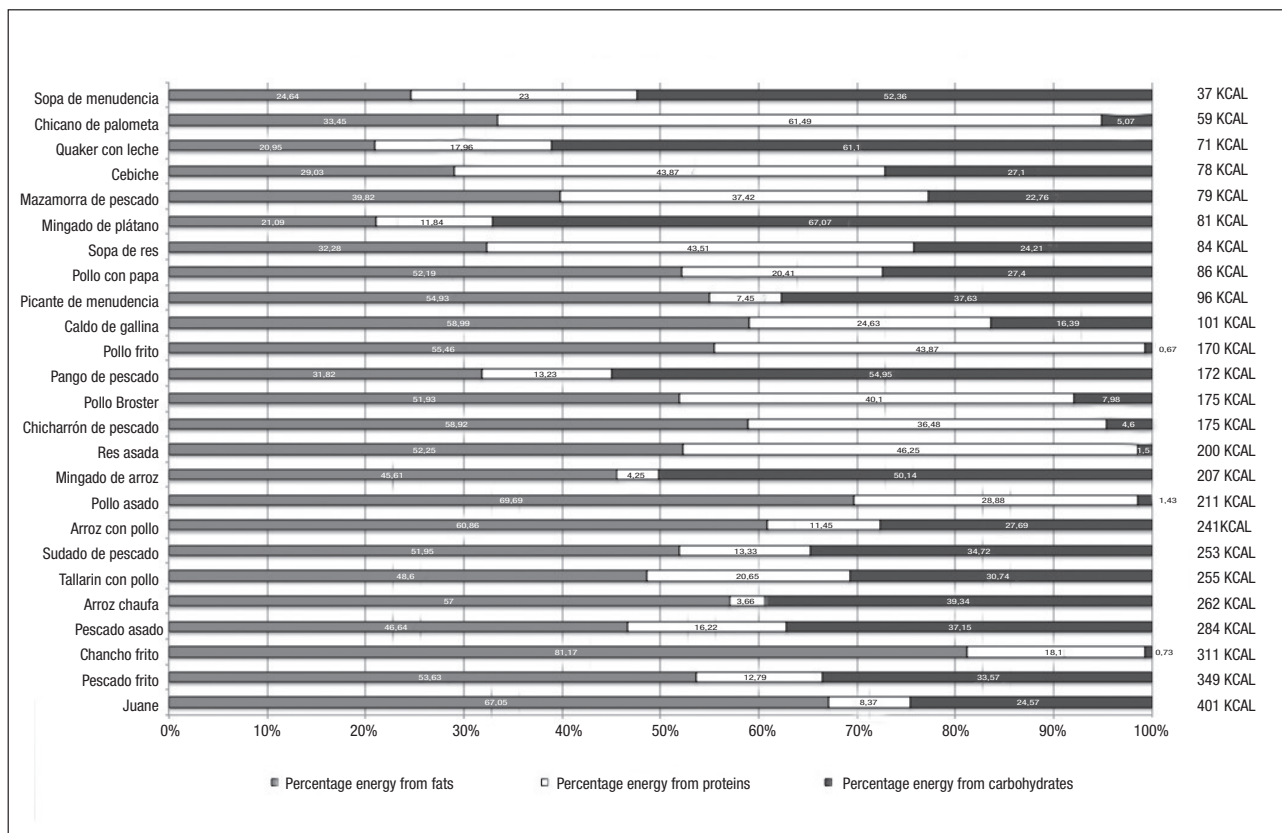Percentage of the RDA of micronutrients for each garnish.

Figure 3.

Percentage of the RDA of vitamins for each recipe.

Figure 4.

Percentage of the RDA of vitamins for each garnish.

Figure 5.

Percentage of energy supplied by each nutritient for each recipe.

Table IV. Energy, macronutrient and micronutrient for each garnish

Garnish	Kca.	Carbohydrate (g)	Protein (g)	Fat (g)	Na (mg)	K (mg)	Fe (mg)	Ca (mg)	P (mg)	Vit A (µg)	Vit C (mg)	Vit B9 (µg)	Vit B12 (µg)	Vit B1 (mg)	Vit B6 (mg)
Arroz hervido	187	14.5	1.5	13.7	286	152	0.3	7.3	26	0	0.8	0.1	0.1	< 0.1	< 0.1
Plátano verde frito	230	24.2	0.8	15.2	1.3	187	0.4	6.2	23	12	4.3	14	0	< 0.1	0.2
Plátano verde cocido	85.2	3.5	0.2	0.1	3	58	0.1	2.9	5	3	1.9	3.3	0	< 0.1	0.1
Plátano maduro frito	216	16.9	0.9	16.8	1.2	122	1.4	56.1	56	200	4.8	18.2	0	0.2	0.3
Plátano verde asado	85	20.8	1.2	0.6	2	350	0.6	7.3	28	18	5.7	20	0	< 0.1	0.4
Frijol hervido	41	59.1	22.7	1.6	12	1359	8.5	138	450	4	5.7	*	*	0.5	*
Ensalada de pepino	45	11.2	0.5	1.1	378	64	0.5	12.9	15	0	1.7	3.5	0	0	0
Yuca cocida	121	16.8	3.3	5.4	10	120	2.5	39.4	44	245	3.5	34.2	0	0.21	0.2
Huevo frito	179	0	13.6	13.9	160	150	2.2	65	230	215	0	40	1.6	0.1	0.1

tein intake, as the amount of food of animal origin is very low in all recipes.

Like other authors (17,18,21), we believe that this type of studies is invaluable in order to assess intake of indigenous population, who are living on a state of transition between life in the jungle and the city. In order to plan interventions based on nutritional education, it would also be very useful to ensure intakes which are more suitable to their needs, which would be affordable and helpful to recover the balance that their ancestors maintained between natural resources and food culture.

In any case, we agree with Bendayán (10) in the idea that it is imperative to rescue the diet which natives had, as they combined primitive meals with the resources obtained from western market. We also believe that successive studies should be aimed to the search and use of fruits, animals, fish and birds from the Amazon with higher protein content to prevent malnutrition in indigenous people (7). While this situation persists, several investigations have already been carried out in this regard (12,28,29). As the author states: "The big alimentary problem in the Amazon lies not only in an economic issue, that is a serious factor, but in the amnesia that has occurred in the village by the western cultural collapse that did not respect or rescued the most important manners in the relationship between man and nature. Malnutrition in Loreto is not strictly an economic issue, it is primarily a cultural problem".

CONCLUSION

If we wish to offer healthier dishes, it is necessary to change their composition and/or cooking methods, reducing the consumption of fried foods. Sodium intake should also be reduced. Two foods could be important: *menudencia de pollo*, rich in B vitamins and low in fat, and *frijol hervido*, which is rich in vegetable protein and, with rice dishes ubiquitous in this area, increases the biological value of the proteins ingested.

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