Chapter 4

Traditional food system of an Awajun community in Peru

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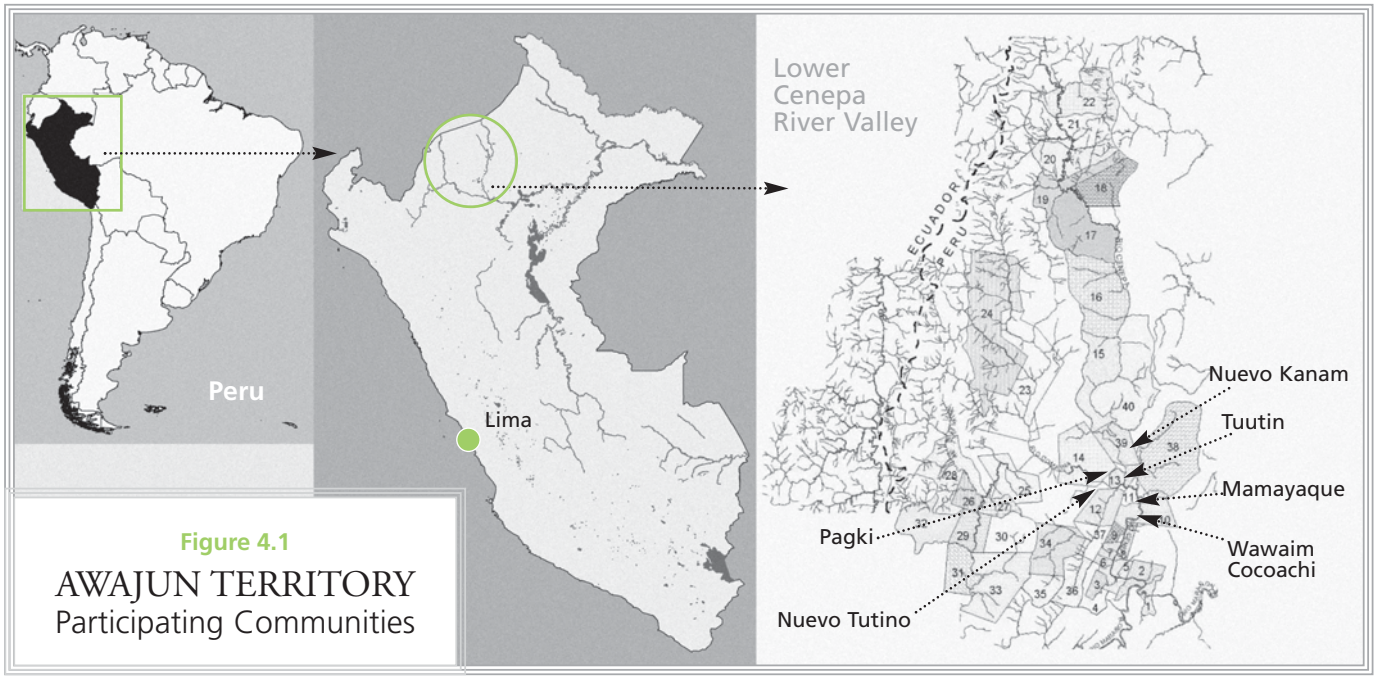

Figure 4.1
AWAJUN TERRITORY
Participating Communities

Data from ESRI Global GIS, 2006.
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Geographic Information Centre,
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Photographic section >> XII

"Ina yutai namakia ajatmay, sinchn sukagtawai nantsaptin ekantawai."

"With our foods from the wild, the river and our fields we are strong and alert."

Awajun saying

Abstract

The traditional food system of the Awajun population of Bajo Cenepa in the Peruvian Amazon is described in this chapter, using a variety of quantitative and qualitative participatory techniques. A wide diversity of food exists – a total of 223 are listed. However, the availability of several of these foods has diminished in recent decades due to changes in community living, farming, hunting and collecting patterns. Scientific identification and nutrient composition data for these foods were found for 82 foods, but such information was not available for the remaining indigenous foods.

Most foods included in this research were produced, collected, hunted or fished locally. Only 12 of the foods listed were purchased from outside of the area, and seven foods were available through government donation programmes. Most foods identified in this study were prepared by boiling, roasting and smoking. Dietary energy intake, evaluated by 24-hour dietary-evaluation recall, appeared to be adequate; the major sources of energy were cassava and banana. Intake of animal source foods, particularly meat and fish, were generally low and infrequent and depended on seasonal availability.

Thus, micronutrient intakes, especially from high bio-available sources of iron (meat and fish products), were low for children. The consumption of vegetables, seeds and fruits was varied and seasonal. Infectious diseases and parasites were predominant health problems and there was a high prevalence of stunting among children. Thirty-four foods, potentially rich micronutrient sources, were selected for further study of their potential promotion in dietary interventions. Mothers' perceptions of these foods were mostly favourable. The information obtained through this study was developed for application to interventions focusing on increased production, knowledge and use of these traditional foods to enhance the health, nutrition and culture of the population.

Introduction

In Peru there are 45 Indigenous Peoples in the Amazon rain forest, comprising a total population of around 300 000 Peruvians (Peru, Ministerio de Salud, Oficina General de Epidemiología, 2003). Although information regarding the nutrition and health situation of these various peoples is scarce, that which is available indicates that 50 percent die before reaching 40 years old and 25 percent before reaching 9 years. Rates of illiteracy (25–45 percent) and fecundity (7.9 children per woman) are high, as well as infant and maternal morbidity and mortality, parasitosis, malnutrition and anaemia (Peru, Ministerio de Salud, Oficina General de Epidemiología, 2002; Peru, Instituto Nacional de Estadística e Informática, 2005).

One of the most important of these Indigenous Peoples is the Awajun, comprised of more than 45 100 inhabitants and living principally in the Department of Amazonas (Peru, Instituto Nacional de Estadística e Informática, 1993). A recent study of the Awajun population described prevalences of chronic malnutrition at 33.4 percent, anaemia at 77 percent in children under three years, and prevalence of anaemia at 50 percent in women of fertile age (Huamán-Espino and Valladares, 2006); the highest prevalences were found in the population of Cenepa. Reasons for this situation have been attributed to the changing ecological, cultural and food systems in that part of Peru (Huamán-Espino, 2006).

The purpose of this study is to describe the traditional food system of the Awajun population of Bajo Cenepa of the Amazon rain forest of Peru, through

the application of the guidelines developed by the Centre for Indigenous Peoples' Nutrition and Environment (CINE) to document traditional food systems of Indigenous Peoples. This assessment was designed to provide essential information to help understand the nutrition and food system of the population with the objective of finding ways to design appropriate food-based interventions to improve micronutrient nutrition in the community. The procedure involved a number of steps using a variety of participatory research methodologies with the community.

Overall description of Cenepa and the Awajun

Geographic location

The Awajun people are indigenous to the tropical rain forest of the Amazon in north-east Peru, residing along the Upper Marañon river and most of its tributaries, at elevations ranging 200–2 000 metres above sea level (Figure 4.1). While the precise geographic limits of the rain forest's extension are not known, it may encompass as much as 22 000 km^2, stretching from the eastern boundary of the river Santiago to the Cordillera del Cóndor to the west, the Pongo de Maseriche to the south, and almost to the Peru-Ecuadorian border to the north (Berlin and Markell, 1977). The district of Cenepa extends from the mouth of the Cenepa River where it joins the Marañón, between the cordilleras (mountain ranges) to the frontier with Ecuador. The source of the Cenepa river is in the Cordillera del Cóndor and extends for a length of 185 km (AECI *et al.*, 2000). In the last two decades the frontier conflicts between Peru and Ecuador have affected the lives of many of the local communities.

This area is known as "high jungle" (*seja de selva*), it is covered by dense rain forest vegetation and the climate is tropical. The annual rainfall is around 3 000 mm, the maximum is during March to April and the minimum is in December to January, humidity is 91 percent. The average annual temperature is 26 °C (AECI *et al.*, 2000), while the maximum rises to around 40 ºC and minimum to 15 ºC.

Demographic characteristics

Traditionally the Awajun lived in widely dispersed hamlets, each consisting of several related households. At the time of this study the majority resided in communities on or near the major rivers of the region. In the 1950s, the Peruvian government coordinated with Jesuit and Protestant missionaries to build schools and missions in the Upper Marañon. Subsequently, many new Awajun communities formed near these schools (Berlin and Markell, 1977). The Jesuits brought the Catholic religion to the Awajun, and in the twentieth century Protestant, and more recently Evangelical, denominations have been introduced.

The district of Cenepa was created by law in September 1941, and in 2000 had an estimated population of 8 000 inhabitants, with a density of 1.5 inhabitants/km^2 (AECI *et al.*, 2000). There are three principal areas: Low Cenepa, Middle Cenepa and High Cenepa with a total of 52 communities. Most of the population settled in the Low and Middle Cenepa. It is the only district in all the Alto Marañón without colonial settlements from other parts of Peru. The present study was conducted with the Awajun communities living on the river in Low Cenepa (Bajo Cenepa).

The population of Cenepa was Awajun with the exception of the district capital Huampami, where 15 percent of the population was of mixed race (*mestizo*). Several public institutions including the district municipality, governor, justice of the peace, police, a health centre and primary and secondary school were located in Huampami.

The economic activity of the Awajun of Cenepa was mostly subsistence farming, hunting and fishing (Ramos Calderon, 1999). The Awajun generally did not sell their produce, which was, for the most part, produced for their families and communities. The few who had cash primarily worked with local organizations or had their own small shops, although collecting gold has been a more recent source of income. Money that was obtained was mostly spent on wood for their housing, medicines, clothes or cooking saucepans.

The principal network of transportation was by river and the feasibility of transport depended on the volume of water in the river. At times of low tides,

boats could not enter the river and the small canoes floated with difficulty; when the water level was high it was often dangerous to navigate. The high cost of fuel posed limitations. Cenepa did not have direct access to any of the highways that link the Alto Marañon to the rest of the country. Communication between communities was also on foot along narrow and steep trails (AECI *et al.*, 2000). Thus, the communities within Cenepa were limited in their connections within the locality, the rest of the province and the outside world. Some communities had a radiophone service and a few had a public telephone, but the service had limited access. The Spanish-speaking radio broadcasting stations of Ecuador and Colombia covered this area and their stronger signals often blocked the scarce transmissions from Peruvian radio broadcasts.

The river and streams were the main sources of water for the population. There was no potable water treatment service in the district; in Huampami there was a water network installed but the water was untreated. There was no sewage system. Rubbish was thrown into the river and faeces elimination was in the open vegetation, or more recently, by use of latrines installed during the last decade by a government agency for development. People washed in the rivers or gorges. *Masato* (fermented cassava) was the most common drink, although when water was drunk it was usually taken directly from the rivers and streams.

There was no electricity in the communities. Only the district capital had electricity, limited to a few hours per day but with frequent interruptions, because of lack of fuel and capacity to support a sustainable service. Generators were present in a few of the communities, primarily used to power radio communication.

Cultural characteristics

Linguistically, the Awajun are one of the four large tribes of the Jivaroan family (Shell and Wise, 1971; Guallart, 1964). They are the largest indigenous population in Peru.

In the Alto Marañón region, Cenepa rates third for its agricultural and forestry potential. This comprises 16 000 hectares for farming and 131 000 hectares available for forestry. At the time of this study, it was estimated that 22 percent of the agricultural potential was being used. In general, the land is agriculturally poor, aggravated by the frequent erosion to which the area is exposed. The physical geographic characteristics also make any interventions difficult. According to the Farming Census of 1994 only 4 percent of land was used for agrarian farming; 95.5 percent was *monte* (wild land) and forest.

Ownership of the land by different extended Awajun families resulted from their occupation of it for numerous generations – sometimes it was obtained peacefully, while at others it came into their possession (as trophies of war) because of conflicts with neighbours. The Awajun are not traditionally sedentary agrarian, but semi-nomadic with economic activities consisting of collecting, hunting, fishing, extraction of wood and resin in small quantities and agricultural activities by clearing. This explains many of the local customs and the search for an ecological balance which leads to periodic migrations to prevent the extinction of hunting and fishing activities and the depletion of the land used for agriculture.

A population centre of the Awajun traditionally comprised several nuclear families related to each other, in a semi-dispersed pattern with houses next to cultivated fields, yet relatively near to each other. These families extended as the daughters married and their new husbands came to live on the lands occupied by his wife's family. In recent times there has been a tendency for several extended families to group together. The family structure was primarily patriarchal, where the man was the principal authority.

In 2000, 99 percent of the houses were built with local material, mostly wood with palm leaf roof, although corrugated iron usage was becoming more common. A house generally consisted of a single rectangular room with a very limited amount of furniture, with small stools and benches used for sitting. At one end of the room was the kitchen, although some families cooked in a separate area (AECI *et al.*, 2000).

The traditional dress of the men is the *Itiak* (men's skirt), but at the time of the study few men used this: the general tendency was to use western clothing, such as trousers and shirts. The women used the *Tarachi*,

generally of garnet or blue in colour and traditionally made with cotton fabrics and woven on a traditional loom. The tendency was to use dresses made of tocuyo (a purchased linen-type cloth). The women adorned themselves with bracelets, necklaces and belts, made from seeds, monkey teeth, small snail shells, feathers and bird beaks.

The Awajun Apu, or Chief, holds the maximum authority in the community, accompanied by the Vice Apu, and two other members, each elected by the community assembly. This assembly, according to the Peruvian Constitution, has autonomy and can apply justice. In the assembly all members including the women must agree when making a decision. At the district level the authorities are the mayor, lieutenant governor and justices of the peace. In only one community was there a notary clerk responsible for registering births.

The primary school curriculum was bilingual. However, the education level was deficient, primarily because of the inadequate training, high turnover of teachers and low salaries. The education infrastructure was precarious with a lack of general educational material, and that which did exist was not adapted to the local context. For instance, there was no educational content relating to their local and traditional foods – in terms of their production, nutritional or cultural roles. Although most of the boys attended primary school, many of the girls did not and very few went to secondary school: hence, the high prevalence of women who were unable to read and write.

Overall health and nutrition status at the time of the study

National data in 2001 reported 25.5 percent of children in Peru under five years of age was stunted, although the prevalence of acute malnutrition was low (Instituto Nacional de Estadistica e Informatica, 2001). However, the nutritional status of children in the rain forest areas was poorer than the national average. Thirty-six percent of children under five years in the Department of Amazonas, including both indigenous and mestizo (mixed) populations, was stunted (Instituto Nacional de Estadistica e Informatica, 2001). Further, 42 percent of children suffered from anaemia, probably owing to low iron intakes and high parasitic load (a nutritional situation similar to that described by Huamán-Espino and Valladares [2006] for the Awajun).

In the Awajun culture there are many taboos affecting women, especially during pregnancy. A pregnant woman tends not to identify her pregnancy because she fears the transmission of bad spirits and believes these may interfere with her pregnancy. The husband attends childbirth and there is a fear that bad spirits may enter the women if another person is present. It is believed that when a woman is menstruating she should not participate in the activities of sowing seeds or fishing.

The most prevalent health problems in the district were shown to include skin infections, poisoning from serpents, helminth infection, intestinal and respiratory infections, mycosis, women's reproductive health problems, as well as suicides and accidents, among others (Instituto Nacional de Salud, Ministerio de Salud, 2000). Medicines provided by the health posts, local shops and medicinal plants are used for treating illness.

In Cenepa, there was a health centre in Huampami serving 1 721 people (20 percent of the population of the district) at the time of this study. Additionally, there were health posts in 14 of the communities. In general terms, the situation of the health sector in the district was deficient, because of both the precarious infrastructure and inadequate implementation of the health posts. The lack of technical and medical personnel, no remuneration for health promoters and the long distances and difficulties of access to the different communities aggravated this situation. Programmes offered in the principal health centre of Huampami included immunization, treatment of diarrhoea and respiratory infections, a growth and development monitoring programme, oral health, food and nutrition, family planning, perinatal health, malaria and tuberculosis control. Parallel to the government health sector, health care was provided by missionary nuns who served community-administered first aid units in 32 communities, with training for health promoters and medicines sold through a government programme.

Vaccination campaigns, carried out by house-to-house visits, using vaccines provided by the Ministry

of Health were conducted by health promoters or the health technician responsible for the local health post. The vaccines given include BCG, polio, DPT, measles, tetanus, rabies and yellow fever. However, the percentage of children between 18 and 29 months who received all their vaccines in the Department of Amazonas was 53 percent, one of the lowest of the country at that time (Instituto Nacional de Estadistica e Informatica, 2001).

As well as the health networks the parallel practice of seeking empirical healers and witchcraft was important to locals, especially for serious diseases.

Methodology

The project was presented initially to the authorities of Organización de Desarrollo de las Comunidades Fronterizas de Cenepa (ODECOFROC) and was approved by the Ethics Committee of the Instituto de Investigación Nutricional, Lima, and the Research Ethics Board of McGill University, Canada. A research agreement was made between the research institutions and ODECOFROC and signed by all parties. The project objectives and participatory methodologies were presented to, and agreements obtained from, each of the participating village assemblies before starting – these placed emphasis on those aspects in which the communities had particular interest, namely further knowledge of their foods, and respecting the limits of the study requested by some communities. Each person interviewed during the course of the study gave prior verbal consent, as did all people photographed.

The study was conducted in six communities in Bajo Cenepa (Table 4.1).

A total of 20 multidisciplinary researchers and assistants, from the four participating institutions and the communities, participated in the fieldwork conducted from February to May 2004. The data collectors were trained and standardized in the research methods using the CINE Manual (Kuhnlein *et al.*, 2006) over a period of two weeks. All interviews were conducted with the assistance of two male translators and one female translator (Awajun-Spanish) who participated in the training process.

Table 4.1 Total population of the participating communities

Community	*Approx No. Inhabitants*	*No. families*
Mamayaque	350	65
Tuutin	350	61
Cocoachi (annex of Wawaim)	638	101
Nuevo Kanam	217	47
Pagki	60	10
Nuevo Tutino	110	22

Preliminary information on the list of local foods and their seasonality was obtained initially through interviews with nine local key informants recognized as having knowledge of the local food system. This list of foods was presented to groups of 25 adults in three community discussion group sessions, lasting two and a half hours each in Mamayaque, where a consensus of the accessibility, preference, and seasonality of Awajun food items for Bajo Cenepa was established and a seasonal calendar developed. Seven Elders were interviewed, one from each of the study communities, to explore foods that were used now infrequently but had been used in the past.

An exercise to identify micronutrient-rich foods was conducted by the project team, including community members and key informants. From the list of all foods, 34 were selected as potentially micronutrient-rich foods for further exploration, with a view to selecting foods for promotion in an intervention to improve the dietary intake of the population, particularly for women and children.

Because of a lack of scientific identification of several plants, 40 plants with Awajun names were selected for identification. Plant specimens (mostly leaves) were prepared according to established procedures and taken to Lima for identification by a botanist, (specialist in plants of this rain-forest region).

Four foods from the region (*suri, ugkush, macambo* and *masato*) were submitted for proximal analysis for energy, protein, carbohydrate and fat content. The total amount of each of the foods received (*suri* 59.6 g, *ugkush* 108.9 g, *macambo* 246.3 g and *masato* 442.4 g) was

lyophilized and homogenized and three samples of each were submitted to standard analytical procedures in the IIN laboratory.

The exploration of the cultural context of the key foods and the diet was conducted through interviews with 49 mothers who had children under six years of age. Several women preferred to have the interview and dietary recall at a central place in the hamlet rather than at their homes. The qualitative exercises, such as understanding the grouping of foods through pile sorting, the exploration of the perceptions of the attributes of foods for young children and taste preferences were conducted with 37 mothers.

Drawings of the different foods were made on cards, or in some cases, the actual foods themselves were used, for these interactive exercises with mothers. Each card was numbered to facilitate coding and subsequent analysis. At the start of each interview the cards were validated to ensure that each mother recognized the foods represented. The pile sort exercise was conducted with 34 mothers with children under two years. Mothers were asked to group the foods freely according to their own perceptions of which foods go together using the cards, and then describe the reasons for each group. This was not an easy task for some of the mothers, as they found it difficult to understand what to do, particularly in giving the reasons for their groupings. The ANTHROPAC software (Analytic Technologies, Harvard, MA) was used for analysis, showing the composite groups and clustering of the foods by all the mothers using Multiple Dimensional Scaling.

Taste preferences were explored for the key foods with 37 mothers and for their 22 children under two years and 29 children over two years. The perceived attributes of the foods for young children were explored with mothers of 31 children under two years and of 30 children over two years. Using the cards, mothers were asked to describe whatever they thought about each of the individual 34 key foods, in relation to their young child. Thirty-one mothers with children under two years of age were interviewed regarding the early feeding patterns of their young child.

A 24-hour dietary recall was conducted with 49 mothers from the six communities who also reported on the dietary intake for their children under two years (n = 25) and two years and over (n = 40). The 24-hour dietary intake was conducted on two consecutive days for each individual with the assistance of a translator. Several foods (such as cassava, banana, etc.) with known weights and local utensils (cups, plates and *pinig* [bowl for drinking]) provided by the mothers were used as references for quantifying food intake and a food scale with precision to 1 gram was also used to assist assessing portion sizes (Roche *et al.*, 2007, 2008). Mothers reported food consumed for themselves and for their children.

A questionnaire was applied to each of the mothers to explore the frequency of consuming the key list of 34 foods by 48 mothers and 32 children under two years of age. These foods were explored for "daily", "weekly", "monthly" or "rarely" or "never used".

Heights and weights of all 48 mothers, 32 children under two years and 39 children over two years were measured as described elsewhere (Roche *et al.*, 2007) using standard methodology (WHO, 1995). Height was measured using a vertical measuring board and recumbent length for children under two years using a rigid stadiometer accurate to 0.1 cm. Weight was measured using a level and digital Salter bathroom scale and for children under two years of age on hanging scales accurate to 100 grams. Body mass index (BMI) was calculated for the adults and Z-scores relative to international reference data for the children (NCHS, 1977).

Results and discussion

General description of the food system

The land cultivated by the families consulted with in this study was dedicated mainly to the production of cassava, banana, peanuts, maize and cacao. In most cases, families had mixed orchards and/or mixed the larger crops with others of less importance. The indigenous vocation was for polycultivation, a system that better adapts to the reality of the rain forests and its soils. Other plants grown included sugar cane, rice, coffee, papaya, citric fruits, *achiote*, *pituca*, pineapple, *sacha*

papa, sweet potato, *tumbo*, red pepper, medicinal plants such as *sangre de grado*, *piri piri*, *ajengibre*, *hierba luisa*, *sacha* garlic, and aromatic plants such as *sacha* coriander. New fruit trees were being cultivated including *arazá*, *carambola*, *aguaje* and *pijuayo*. In past years there has been considerable production of cacao in Cenepa. Production diminished due to fungal disease and lack of technical management. Organic coffee was being cultivated in the higher part of the Cenepa.

The majority of native families raised hens, turkeys, ducks, guinea pigs, and pigs; these last two were raised only in some communities and on a small scale. Animals were raised for family consumption as well as for monetary income by their sale. Recently, private and public institutions have started fish farms and poultry-raising. In both cases, the technology available for these ventures was precarious, although efforts were being made to follow up on the feeding and sanitary aspects, as well as providing technical training. Frequent diseases, affecting the raising of poultry, have been reported. Further, many animals were lost through attacks by wild animals. The women traditionally cultivated the fields – although recently this was limited to cassava and banana – and raising small animals near their homes.

Traditionally the Awajun men dedicated a great part of their time to hunting. The preferred mammals were the *sajino*, *hungana*, American tapir (*sachavaca*), deer, *tigrillo* and *otorongo*. Less frequently hunted animals included *ronsoco*, *achuni*, *añuje,* armadillo, and different kinds of monkeys and birds. Over-hunting has diminished the number of animals populating traditional hunting grounds. The products obtained from hunting (meat, leather, feathers, teeth and bones) were used for nutritional, artisanal, medicinal and witchcraft use. Contact with non-native groups has led to the commercialization of some of these products – especially skins, snake venom and meat (to a lesser extent).

More than 150 varieties of fish were identified – constituting a major source of the animal products available to this population – along with a number of other aquatic animals, such as snails, shrimps, crabs, frogs, *sábalo*, *palometa*, *liza*, *doncella*, *boquichico*, *corvina*, *yahuarachi*, Hungarian ray, *fasaco*, among others. Fish was used for family consumption. However, there was less fishing (traditionally done by the men) as there were fewer fish resulting from indiscriminate fishing and contamination of the river because of mining activity in the hills of the Cordillera del Cóndor as described for other Amazon populations (Passos *et al.*, 2003).

Our study showed that it was women who mostly collected the wild fruits from palms and other trees (such as the *uvilla*). They also gathered shrubs, as well as the sprouts of palms, stems, cortex and resins. Edible larvae (*suris*) and other insects were collected for food. More recently however, with the over-harvesting of fruit and fruits trees including palms, the collection of several of these foods has diminished.

Cassava and banana constituted the basis of the food of the Awajun population, supplemented with small portions of meat, and sometimes a little fish. The preparation of food was a women's activity, and foods were prepared most usually by roasting and boiling. *Masato*, a drink prepared from cassava by the women, was an important food, which could be consumed either fermented or unfermented and contributed a high proportion of energy to the diet. Meat and fish were generally smoked or kept dried with salt and wrapped with leaves, or placed directly over the wood fire. The slow drying and smoking allowed the meats to be kept for relatively long periods. Owing to the contact with urban culture, feeding habits modified and new foods purchased from outside traders who sold their produce through the few small, local shops, although in relatively very small quantities. These included sugar, rice, canned fish, canned milk, pasta, onions, oats, cakes, biscuits and bread among others.

During the research period the government offered food programmes through the Ministry of Women's Affairs (Programa Nacional de Asistencia Alimentaria [PRONAA]) providing rice, beans, oil and tuna fish. The municipal "Glass of Milk" programme provided children with milk and sweetened oats, although irregularly.

There was little commerce in the area, mostly due to the lack of surplus production and the high cost of

transport required to take produce to main population centres. The communities of the Alto Cenepa did not trade their products; those of Bajo Cenepa sold small volumes of banana and wood outside of the area, transported by boat; and Middle and Bajo Cenepa sold products such as banana, cassava, hens and small birds to larger population centres, such as Huampami and Kusu Kubaim. The main consumers of these latter products, although on a small scale, were government officials, teachers and the military located in the area.

List of foods

A total of 223 foods were identified within the food system of the Awajun, the majority having local Awajun names. Many of the foods did not have Spanish names: thus it was difficult to find equivalent English names. This was reported on previously (Hauamán-Espino and Valladeres, 2006), where 100 currently used foods were listed. The full list of Awajun foods and their nutritional composition where known, was given to ODECOFROC and each of the participating communities and can be viewed at www.mcgill.ca/ cine/resources/data/

The complete list of Awajun food species is presented in Table 4.2; in Table 4.3, a shortlist of unique foods is presented with nutrient composition. Four foods/preparations for energy and macronutrient content were analysed. Foods selected included a green leaf (*ugkush*), seed (*macambo*) and an animal source food (*suri*), potentially rich sources of nutrients, and the community also wanted to know the nutritional composition of their staple drink, *masato*. Of note is the nutritional value of *suri*, which is an important source of nutrients, although not as high as edible worms reported elsewhere in Latin America (Paoletti *et al.*, 2003; Paoletti *et al.*, 2000).

Scientific names and published nutritional composition were found for only 82 of the foods. Among these foods, 34 were mentioned by Awajun Elders as being popular in the past, but no longer in use at the time of this study. They belong to the following groups: animals (10), birds (10), fruits (8), vegetables (1) and tubers (5). A significant reason why these foods were not used as frequently as before, or were no longer consumed, was that they were much further away in the wild hill country, particularly the animals and birds. Also, as the Awajun lived in larger communities, there was over-hunting and harvesting of several animals and plants, while some fruits and vegetables were no longer being planted and harvested.

Locally produced food was bought and sold between families and communities when harvested. Only 12 of the total foods were listed as being bought from the local village shops – these are not local, but industrially produced: rice, noodles, sugar, salt, oil, milk (evaporated and dried), tinned tuna fish, eggs, soda, cookies and sweets. In general, there was a lack of commercialization in the area, as well as low cash resources among the Awajun population. As such, the community population rarely, if ever, went to a market or local urban centre to buy food.

There were also several government assistance programmes that brought donated industrialized foods into the area. These included rice, oil, beans, tinned tuna, tinned salmon, evaporated milk and sugared oats. They were donated through PRONAA and the "Glass of Milk" programme.

Scientific identification and analyses

To help complement the scientific identification, 40 plants with Awajun names were selected for identification, of which 25 were identified by a botanist.

Key micronutrient-rich traditional foods

From the 223 foods listed, 34 were selected as potentially micronutrient-rich foods for further exploration, with a view to selecting foods for promotion in an intervention to improve the nutritional intake of the population, particularly women and children's (Table 4.4). Foods were selected from the different food groups and chosen on the basis of (a) frequency of mention, (b) probable micronutrient content and potential for making a contribution to nutrition of the population, (c) mentioned as being liked by the population, and (d) availability during different seasons. A few less-frequently used foods with possible potential for increased use were included.

Table 4.2 Awajun traditional foods

	Scientific name	*English / common name*	*Local name*	*Spanish name*	*Seasonality*
	Vegetables				
1	*Arachis hypogaea*	Peanut	duse	mani crudo perado, con pelicul	October–January
2	*Astrocaryum chambira*	Green leafy vegetables	datsatsam	verdura verde	January–December
3	*Astrocaryum* sp.	–	uwan	huicungo	January–December
4	*Bactris gasipaes*	Peach palm/pewa nut	uyái	pijuayo e.p.	February–April
5	*Caladium bicolor*	–	manchup	manchup	January–December
6	*Capsicum annuum*, *Capsicum frutescens*	Chili pepper	jima	ají	December–February
7	*Caryodedron orinocensis*	Stilt palm	shimpi	palmera	January–December
8	*Cucurbita maxima*	Squash	yuwí	zapallo	January–December
9	*Cyclanthera pedata*	Kaikua	caigua	–	January–December
10	*Euterpe precatoria*	–	yayu, sake	huasai	January–December
11	*Lycopersicon esculentum*	Tomato	tomatillo	tomate	–
12	*Manihot esculenta*	Manioc leaves	namag/mamá duke	hojas de yucca	January–December
13	*Piper* sp.	Green leafy vegetables	ugkush (col de monte)	verdura verde	January–December
14	*Philodendron* sp.	Green leafy vegetables	eep (col de monte)	verdura verde	January–December
15	*Phytelephas* sp.	Tagua palm	tintuk	–	January–December
16	*Socratea exorrhiza*	–	shiim (chonta)	–	January–December
17	*Xanthosoma* sp.	–	tunka	tuka	January–December
18	*Xanthosoma* spp.	Cocoyam	sanku	huitina	January–December
19	*Zea mays*	Corn	shashak shaa	maiz	–
20	–	Kupat	–	–	January–December
21	–	Ungurahui	–	–	–
22	–	A flower	sonat	sonat (flor)	–
23	–	Mushrooms	essem	hongos	–
24	–	Palm heart	iju	chonta e.p.	–
25			tsemantsem	tsemantsem	
	Fruits				
1	*Ananas comosus*	Pineapple	pina	pina e.p.	October–December
2	*Artocarpus altilis*	Breadfruit	kistian pitu	pan de árbol del monte	February–March
3	*Astrocaryum chambira*	Chambira palm	batae	chambira	February–April
4	*Theobroma bicolor*	–	papai, wakam/wakampe	papaya e.p., macambo/ semilla de macambo	January–December
5	*Caryodendron orinocensis* (2 var.)	–	naam	sachamaní	December–March
6	*Caryodendron orinocensis*	Stilt palm	shimpi	–	January–March
7	*Citrus limon*	Lemon	yumung	limon	January–April
8	*Citrus sinensis*	Orange	najan	naranja	January–May
9	*Clavija* sp. (2 var.)	–	kunakip, yampak	–	January–February
10	*Cocos nucifera*	Coconut water	–	coco, agua de	–
11	*Couma macrocarpa*	Milk tree	duam	leche caspi	February–April

Continued

Table 4.2 *(continued)* Awajun traditional foods

	Scientific name	*English / common name*	*Local name*	*Spanish name*	*Seasonality*
12	*Fabaceae*	–	dapujuk	–	January–March
13	*Grias peruviana*	–	apai	sachamango	March–May
14	*Herrania mariae*	Wild chocolate	kushikan	huacarapona	January–April
15	*Inga nobilis*	Inga	wampushik	inga	January–March
16	*Mauritia flexuosa*	Mauritia palm	achu	aguaje	September–May
17	*Moraceae*	–	shagkuina	–	–
18	*Musa balbisiana* (2 var.)	Banana	pantam, seetash	plátano	January–December
19	*Musa* sp. (3 var.)	Banana, Guinea banana	pantam, guino	plátano de seda, plátano de isla, plátano guineo (grano de oro)	January–December
20	*Oenocarpus bataua*	Bataua palm, pataua palm	ungurahui	palma seje (Venezuela)	February–April
21	*Passiflora ligularis*	Passion fruit	munchi	granadilla	January–June
22	*Persea americana*	Avocado	kai	palta	September–November
23	*Phytelephas* sp.	Taqua palm	chapi	yarina	–
24	*Pouteria sapota*	Sapote	taperiwa	guanabana	–
25	*Pseudolmedia laevigata*	–	chipi	–	January–March
26	*Psidium guajava*	Guava	shawi	guayaba	January–April
27	*Renealmia alpinia*	Achira del monte	kumpia	achira del monte	October–March
28	*Rollinia microcarpa*	Custard apple or prickly custard apple	anuna	anona	December–February
29	*Saccharum officinarum*	Sugarcane	pangaat	cana de azucar	January–December
30	*Senecio herreanus*	Gooseberry	shuiña	uvilla	December–February
31	*Sicana odorifera*	Secana	namuk	secana	January–December
32	*Socratea exorrhiza*	–	shiim	–	January–December
33	*Solanum coconilla*	Coconilla	kukush/shiwankush	cocona	–
34	*Solanum* sp.	Cocona	shiwag kukush/kukuch	cocona e.p.	January–December
35	*Theobroma cocao*	Chocolate bean	bakau	coco de cacao	January–December
36	*Theobroma* sp.	–	akagnum	–	January–April
37	–	–	apeich	–	–
38	–	–	arazá	arazá	January–April
39	–	–	caimito	–	December–February
40	–	–	charichoelo	–	–
41	–	–	dack pau	–	–
42	–	–	dupi	–	January–February
43	–	–	inák	chupé	February–March
44	–	–	copal	–	March–April
45	–	–	naranjillo	naranjillo	–
46	–	–	shajimat	–	February–March
47	–	–	supinim	–	June–July
48	–	–	takash pantam	sachaplatano	–
49	–	–	tayutim	kunchai	–

Continued

Table 4.2 *(continued)* **Awajun traditional foods**

	Scientific name	*English / common name*	*Local name*	*Spanish name*	*Seasonality*
50	–	–	tejesh	–	March
51	–	–	tintuk	–	January–December
52	–	–	tumpu	tumbo	June–July, Oct–Nov
53	–	–	ujunts	–	March–April
54	–	–	wañam painim	–	January–February
	Tubers				
1	*Burseraceae*	–	uju/mun uju	–	January–April
2	*Caladium bicolor*	–	manchup	–	January–December
3	*Colocasia esculenta*	Taro	pituk	pituca o taro	January–December
4	*Dioscorea trifida*	Yam	kégkeg	sachapapa	April–August
5	*Dioscorea* sp. (2 var.)	–	keghegkeg, tsegkup	sachapapa morada	April–August
6	*Ipomoea batatas*	Sweet potato	idauk	camote	January–December
7	*Lepidium peruvianum* Chacon	Maca	maca	maca	–
8	*Manihot esculenta*	Cassava, manioc	máma/ yujumak	yuca	January–December
9	*Maranta arundinacea*	Arrowroot	chiki	maranta	January–December
10	*Pachyrrhizus tuberosus*	Yam bean	ahipa nambauo huacarapona	–	January–December
11	*Xanthosoma* sp.	–	tunka	–	January–December
12	*Xanthosoma* spp.	Coco yam	sanku	huitina o unchucha	January–December
13	–	–	kegkegkee	sachapapa del monte	April–August
14	–	–	kiyam	papachina	January–December
	Fish				
1	*Ancistrus* sp.	–	shuvi	carachama mediano	–
2	*Brycon* sp. (3 var.)	–	kamit, kusea, huampi	paco-gamitana, sávalo (sábalo), sábalo macho	January–December –
3	*Canthopomus* sp.	–	putu	carachama, cashca	–
4	*Cichlasoma* sp.	–	kantash, huapujúsh	bujurque	April–December
5	*Caranx cynodon gibbus*	–	kujancham daí	denton	–
6	*Characiformes caranx*	–	tujún /tsajun	–	January–December
7	*Characiformes caranx*	Pike	champejam	–	January–December
8	*Characiformes charanx moenkhausia*	–	mamayak	pescado mojarra e.p.	January–December
9	*Characiformes mylosoma*	–	paomít	palometa	January–December
10	*Cynodon* sp.	–	huampikus	chambira	January–December
11	*Cyprinodontiformes poecilidos*	Livebearer	yuvi	poecílidos	January–December
12	*Gymnotiformes gymnotid*	–	puepuen	carapo	January–December
13	*Hoplias malabaricus*	–	kunkui	huassaco/fasaco	January–December
14	*Luciocephalus* sp.	–	chuvio	anashi	January–December
15	*Potamotrygon hystrix*	–	kashap	raya	January–December
16	*Prochilodidos leoprinus*	–	katish	pescado lisa e.p.	January–December
17	*Prochilodus* sp.	–	kagka	boquichico fresco	April–December

Continued

Table 4.2 *(continued)* Awajun traditional foods

	Scientific name	*English / common name*	*Local name*	*Spanish name*	*Seasonality*
18	*Pseudopimelodus* sp.	Catfish	tunké, yutuí	zungaro	January–December
19	*Rivulus* sp.	Livebearer	huásusum	poecílidos	January–December
20	*Roeboides* sp.	–	suyán	oropendola	January–December
21	*Siluriformes astroblepidae*	Catfish (small)	dukum	bagre chico	–
22	*Siluriformes callichtyidos coridoras*	–	sinkijuash	shirue	January–December
23	*Siluriformes cetoposids*	Catfish	baús, bauts	–	January–December
24	*Siluriformes diplomistidos*	–	kigigi	–	January–December
25	*Siluriformes doradidos pseudo-doras*	–	tujushik	cahuara	January–December
26	*Siluriformes loricardididos* (6 var.)	Catfish	kaejam, nankiputu (nanki putu), nayump, pakash, putu, sachem	carachama chiquita, carachama delgado grande, carachama	January–December
27	*Siluriformes loricardididos loricaria*	–	shajam tsutsum	cashca	January–December
28	–	–	sacham	carachama chiquita	–
29	*Siluriformes pimelodids* (3 var.)	Catfish	butta, inkancham/kunchi, kumpoau	mota, bagre, bagre mediano	January–December
30	*Siluriformes pimelodids sorubim*	Catfish	titín	shiripira	January–December
31	–	Fish	namak	pescado bagre e.p.	–
	Shellfish				
1	*Macrobrachius brasiliensi*	Shrimp	majúsh	camarónes frescos e.p.	–
2	*Pelanus laturus*	Crab	ujik	cangrejo	–
3	*Pomacea* sp.	Snail	tsuntusu	caracoles e.p.	–
	Animals				
1	*Alouatta seniculus*	Howler monkey	yakum	mono	–
2	*Ateles* sp.	Spider monkey	washi	mono	–
3	*Callicebus* sp.	Monkey	kuji	mono	January–June
4	*Cavia porcellus*	Guinea pig	utu	cuy	–
5	*Cuniculus paca*	Paca	kashai	majas	February–April
6	*Dasyprocta aguti*	Agouti	kañuk	añuje	January–December
7	*Mazama* sp.	Deer	japa	venado	January–March, September–December
8	*Nasua nasua*	Ringtailed coati	kúshi	achuni	January–December
9	*Sclurus* sp.	Squirrel	waiwásh	ardilla	January–April
10	*Sus scrofa* (2 var.)	Pig, wild pig	kúchi	cerdo, jabali	January–December
11	*Sylvilagus brasiliensis*	Rabbit	wápajush	conejo	January–December
12	*Tapirus terrestris*	Tapir	pabau	sachavaca	January–March
13	*Tayassu pecari*	White lipped peccary	paki	huangana	–
14	*Tayassu tajacu*	Collared peccary	yunkipác	sajino	January–April
15	*Daypus noremcinctus*	Armadillo	shushui	armadillo	June–July
16	–	Animal organs	kuntinu /ampuji	visceras de animales	–

Continued

Table 4.2 *(continued)* **Awajun traditional foods**

	Scientific name	*English / common name*	*Local name*	*Spanish name*	*Seasonality*
	Birds				
1	*Aburria aburri*	Wild turkey	huachu	pavo del monte	–
2	*Columba subvinacea* (2 var.)	Wild pigeon/dove	yapagkam/yampis	paloma del monte	–
	Columba sp.	Pigeon/dove (small)	tsabau yampis	paloma chica	–
3	*Cyanocorax violaceous*	Violaceous jay	kijuánchan	–	–
4	*Gallus gallus*	Hen, chicken	atásh	gallina/pollo	January–December
5	*Gallus gallus*	Chicken's egg	atashú nujinji	huevo de gallina	January–December
6	*Icterus* sp.	–	chuwi	oropendola	July
7	*Leptotila rufaxilla*	–	shimpa	–	–
8	*Monasa nigrifrons*	–	tiuju	–	–
9	*Oreotrochilus estella*	Humming bird	jempe	picaflor	–
10	*Penelope jacquacu*	Spix's guan	aunts	pucacungo	–
11	*Psophia crepitans*	Trumpeter	chiwa	trompetero	–
12	*Pyrrhura* sp.	Parakeet	kijus	pericos	–
13	*Ramphastos cuvieri*	Tukan	tsukangá	tucán	July
14	*Steatornis caripensis*	–	tayu	–	–
15	*Tinamus tao*	Partridge, grouse	sekush	perdiz azulada	–
16	*Zenaida asiatica*	Dove	yampis	paloma de la selva	–
17	–	Duck	patu	pato	January–December
18	–	Parrot	kuwau	loro	–
19	–	Parrot	tuwish	loro	January–March
20	–	Partridge, grouse	waga	perdiz	January–March
21	–	Parrot (small)	inkancham	loro chiquito	–
22	–	Partridge, grouse (small)	puush	perdiz chico	–
23	–	Tukan (small)	kejua	tucán chico	–
24	–	Tukan (small)	pinish	tucán chico	–
25	–	Woodpecker (small)	kuintam	carpintero chico	–
26	–	Woodpecker	tatasham	carpintero	–
27	–	–	achayachik	–	–
28	–	–	ayachui	montete	February–March
29	–	–	chikui	–	–
30	–	–	chiwchiwa	–	–
31	–	–	jempekit	–	–
32	–	–	jempemu	–	–
33	–	–	kajuntsan	–	–
34	–	–	kanampus	–	–
35	–	–	kigtachik	–	–
36	–	–	kugchacham	–	–
37	–	–	kunchau	–	–

Continued

Table 4.2 *(continued)* Awajun traditional foods

	Scientific name	English / common name	Local name	Spanish name	Seasonality
38	–	–	kúte	–	–
39	–	–	mantset	–	–
40	–	–	pipjuan	–	–
41	–	–	pisumash	–	–
42	–	–	sawake	–	–
43	–	–	semanchuk	–	–
44	–	–	seuk	–	–
45	–	–	shik	–	–
46	–	–	sugka	gallitos de las rocas	–
47	–	–	takaikit	–	–
48	–	–	tawai	–	–
49	–	–	teesh	–	July
50	–	–	timantin	–	–
51	–	–	tugtumpiu	–	–
52	–	–	tuswam	–	–
53	–	–	tuwits	–	–
54	–	–	ugkun	–	–
55	–	–	ushap	–	–
56	–	–	wakants	maracaraco	October–March
57	–	–	yukupau	–	–
	Amphibians and Reptiles				
1	*Colostethus* sp. (2 var.)	Frog	súakaraip	rana	January–December
2	*Podocnemis unifilis*	Yellow-spotted Amazon River turtle	kugkuim	tortuga	January–December
3	*Polychrotidae*	Lizard	nantana	lagarto	January–December
	Insects				
1	*Coleopterus*	Palm larva	bukin	suri/ larva de palma	January–December
2	*Hymenoptera brachygastra*	Wasp larvae	ete téji	huevos de avispa	January–December
3	*Hymenoptera formicidae*	Ant	maya	hormiga del árbol	January–December

e.p. Edible portion.
– No data.

Table 4.3 Macronutrient composition of analysed Awajun foods *(per 100 g fresh weight)*

Food	kcal	kJ	Protein g	CHO g	Fat g	Ash g	Water %
Ugkush (green leaf)	77	322	0.75	14.08	0.99	2.79	81.4
Masato (fermented cassava drink)	35	146	0.04	7.75	0.04	0.61	91.6
Whole *Suri* (insect larvae)	273	1 141	1.40	13.15	21.96	0.92	62.6
Macambo seeds	718	3 001	3.37	34.35	53.7	2.67	5.9

Table 4.4 Shortlist of key foods rich in micronutrients

Scientific Names	*English*	*Awajun*	*Spanish*	*Varieties*	*Edible Portion*
Arachis hypogea	Peanut	duse	maní	6	seed
Bactris gasipaes	Peach palm	uyai	pijuayo	4	fruit
Caladium bicolor	–	manchup	manchup	–	tuber
Carica papaya	Papaya	wakampé jigkañi	semillas de macambo	1	seed
Citrus sinensis	Orange	najag	naranja	1	fruit
Coleopterus sp.	Palm larvae	bukin	suri	–	larvae
Colocasia esculenta	Taro	pituk	pituca	2	tuber
Colostethus sp.	Frog	suakaraip	rana	–	meat
Columba subvinacea	Dove	yampis	paloma del monte	–	meat
Columba subvinacea	Wild pigeon	yapagkam	paloma del monte	–	meat
Cucurbita maxima	Squash	yuwí	zapallo	1	fruit
Gallus gallus	Chicken	atash	pollo	–	meat
Gallus gallus	Chicken's egg	atashúnujinji	huevo de gallina	–	egg
Grias peruviana	–	apai	sachamango	–	fruit
Hymenoptera brachygastra	Wasp larvae	eté téji	huevos de avispa	–	larvae
Ipomoea batatas	Sweet potato	idauk	camote	3	root
Manihot esculenta	Manioc cassava	mamá / yujumak	yuca	31+	root
Manihot esculenta	Manioc leaves	mamá Duke	hoja de yuca	31+	young leaves
Mauritia peruviana	Mauritia palm	achu	aguaje	1	fruit
Musa balbisiana	Banana	pántam	plátano	17+	fruit
Philodendron sp.	Green vegetables	eep	verdura verde	–	leaves
Phytelepas sp.	Vegetable ivory	chapi	yarina	1	fruit
Piper sp.	Green vegetables	ugkush	verdura verde	–	leaves
Pomacea maculate	Snail	tsuntsu	caracol	–	flesh
Pseudolmedia laevigata	–	chipi	chipi	–	fruit
Solanum coconilla, *S. quitoense, S. flavesceno*	Cocona	kukuch	cocona	7	fruit
Theobroma bicolor	–	wakam	macambo	1	fruit
–	–	tsemantsem	–	–	vegetable
–	Mushrooms	esem	hongos	–	entire
–	Palm heart	iju	chonta	–	entire
–	–	inak	chupé	–	–
–	Pig	kuchi	cerdo	–	meat
–	Fish	namak	pescado bagre e.p.	–	meat
–	Animal organs/viscera	kuntinu Ampuji	visceras de animales	–	flesh

– No data.
e.p. Edible portion.

Patterns of harvest, storage and preparation of the key foods

Awajun women went daily, or every other day, to their fields to obtain food: thus, there was little storage of foods. Fish were regularly caught from the rivers or fish ponds and mostly consumed fresh. They were harvested from the fish farms approximately every three months, but were caught individually at other times. Meats hunted from the wild were preserved; they were most commonly dried with salt and then smoked. There were also some recent initiatives to preserve fruits by making jams at the time of high production, such as with *cocona*.

In general, the form of preparation of foods was simple: boiled, roasted, smoked, raw or in *patarashka* (the food is wrapped in banana leaves and placed over the wood stove). It was rare to find fried foods in the Awajun diet. Foods such as cassava and banana were used to prepare *masato* and *chapo* drinks, respectively. Other drinks were made from fruit juices.

Mothers' and children's preferences for foods

Preferences were explored for the 34 key foods for mothers and children and most were reported as liked by both mothers and children, except for squash and cassava leaf. The mothers also reported that, in contrast to their children, they did not like wasp larvae and that their children did not like the green leafy vegetable *ugkush*.

Table 4.5 Mean and median energy and macronutrient intake by Awajun mothers and children

		Mothers (n=49)	*Children 6 mo to 2 y* (n=25)	*Children 2 to 8 y* (n=40)
Energy kcal/day	Mean	3 738	997	2516
	Median	3 388	864	2416
	sd	±1567	±736	±1039
Energy from animal sources kcal/day	Mean	226	126	156
	Median	205	57	90
	sd	±199	±148	±156
Protein g/day	Mean	58.2	21.8	46.1
	Median	55.8	25.3	39.8
	sd	±27.5	±17.4	±23.8
Protein from animal sources g/day	Mean	23.7	10.4	14.4
	Median	17.4	6.7	10.8
	sd	±20.1	±10.6	±14.3
Fat g/day	Mean	32.9	12.0	27.0
	Median	21.9	10.6	17.9
	sd	±28.6	±11.3	±24.0
Carbohydrate g/day	Mean	823	208	540
	Median	723	164	505
	sd	±359	±160	±225
Fibre g/day	Mean	29.2	6.3	17.7
	Median	28.6	5.2	15.8
	sd	±14.0	±5.3	±7.8

Foods most available nearby

Cassava, banana and *cocona* were the foods most available locally, and sugar cane, sweet potato, pineapple, *sachapapa*, fish, hens, *pituka* and *tuca*, as well as the fruits *sachamango*, *chupé*, *aguaje* and *yarina* were available seasonally.

Dietary evaluations

Estimated dietary intake by 24-hour recall

Intakes of energy and macronutrients were evaluated by two successive dietary recall days. Imputed nutrient values from similar foods were used when needed. Overall, women's intake of local Awajun food formed 93 percent of total dietary energy, with the balance being from purchased food. For children aged 2–12 years, 85 percent came from local Awajun food, with 15 percent from purchased or donated (primarily rice and tuna) food. Table 4.5 shows the mean, median and standard deviation of the intakes for energy and macronutrients for the mothers, children under two years and children over two years.

Mean and median energy intake of mothers was apparently high (3 738 and 3 388 kcal per day, respectively), although only 6 percent of energy came from animal sources; 6.5 percent of energy was from protein and 7.9 percent from fats, indicating that the major source of energy was carbohydrate. The fibre content of the diet was also high (29 g) – however, there was a wide variation. The food preparations that provided most of the energy were boiled foods, followed by roasted foods. The boiled foods were mainly bananas, tubers and roots, including cassava, *sachapapa* and *pituka*. The roasted foods included cassava, banana, *macambo* seeds and fish. The preparations from animal sources that provided most energy were milky drinks and soups – mostly due to the use of chicken or egg in the ingredients.

Twenty-five children between six months and two years old were included in the 24-hour recall for complementary foods (non-breastmilk). Eight children under six months were excluded. Mean energy intake from complementary foods was 997 kcal per day; 12.6 percent of energy came from animal sources, 8.4 percent from protein, and only 10.6 percent from fats, again indicating that the principal source of energy was carbohydrate. Again, the food preparations that provided most of the energy were the boiled foods, mainly banana, and the tubers and roots (cassava, *sachapapa* and *pituka*) followed by milk preparations and cereals such as rice. The preparations providing most energy

Table 4.6 Energy intake of mothers and children by source of foods

		Mothers (n=49)	*Children 6 mo to 2 y* (n=25)	*Children 2 to 8 y* (n=40)
Energy from local sources kcal/day	Mean	3478	780	2138
	Median	3133	549	1942
	sd	±1 567	±611	±1044
Energy from market/donated foods kcal/day	Mean	261	217	379
	Median	106	30	234
	sd	±329	±302	±432
Percent energy from local foods	Mean	92	82*	85
	Median	97	92	90
	sd	±11	±21	±17
Percent energy from market/donated foods	Mean	8.1	17.5*	15.2
	Median	2.8	7.6	9.5
	sd	±10.8	±21.2	±17.3

* Excluding 3 infants exclusively breastfeeding

Table 4.7 Reported frequency of consuming key foods by Awajun mothers and children

Daily	*Weekly*	*Monthly*	*Seldom/never*
Cassava	Eep	Tsemantsen	Cassava leaf
Banana	Ugkush	Palm heart*	Squash
Chupé	Palm heart*	Suri	Manchup
Macambo	Egg	Orange	Sweet potato
Macambo seeds	Fish*	Yarina	Pork
Cocona	Taro	Wasp larvae	Yapagkam
Pijuayo		Chicken	Parrot
Aguaje		Frog	
Sachamango		Fish*	
Peanuts		Viscera	
		Yampis	

* Foods listed as weekly and monthly were mentioned in each by a similar number of respondents.

from animal sources were milk (and milk preparations), and soups (again mainly because of the presence of chicken or egg).

The mean daily energy intake of the 40 children between two and eight years of age was 2 516 kcal, and only 6.2 percent of the energy was provided by animal sources. Only 6.7 percent of energy came from protein and 7.1 percent from fats. The food preparations providing most energy (mainly from animal sources) were very similar to the younger children.

Mean and median total micronutrient intakes for adult women appeared to be adequate although, as mentioned below, there may have been some over-reporting of food intake. The principal source of minerals in the diet was vegetables, while intakes from high bio-available animal sources were low. The lowest intakes of several micronutrients were those of the infants and young children, specifically for iron with a median intake of 4.9 mg/day for children 6–24 months (mean recommended intakes are 9.3–5.8 mg/day depending on age and assuming medium bio-availability) (FAO/WHO, 2002), especially iron from haeme sources (median 0.33 mg/day). Total zinc intake was near to recommended (4.1 mg/day) intakes (median 3.89 mg/day), but zinc from animal sources (median 0.8 mg/day) and calcium (median 134 mg/day) were low (mean recommended intakes for calcium 400–500 mg/day depending on age), although some calcium would be obtained from breast milk by these children.

The foods or food preparations that were most commonly consumed by the mothers and children were cassava, banana and *masato*. Although fermented for normal adult use (and fermented for a longer period of time for celebrations or parties), *masato* was given to the children when freshly prepared and non-alcoholic.

The large variability in reported amounts of food and high intakes of energy obtained through the 24-hour recalls was surprising. Although the women and children were physically active in their daily work routines, these intakes were not consistent with their body weights. A typical meal consisted of the family sharing food from a common plate of banana leaves, and it is believed by the researchers that some mothers may have reported what was served for the family, or did not know how much each of the individual children ate, thus there may have been some over-reporting. This will be verified in future studies.

Sources of food

Table 4.6 shows that a high proportion of the energy of the diet came from locally produced foods and that comparatively little food was from outside sources. This was slightly higher with children, due to the donated "Glass of Milk" programme.

Food frequency

The frequency of consuming the foods in the key list of 34 foods by the mothers and children (under two years of age) is presented in the Table 4.7. The foods are listed under the most commonly reported frequency, whether daily, weekly, monthly or rarely/never. Cassava and banana were consumed daily, as also reported by Huamán-Espino and Valladares (2006); other foods were seasonal.

Infant-feeding practices

All mothers reported breastfeeding their child, and 74 percent reported giving colostrum. Boys and girls were treated equally in this regard. At the time of the interviews, 26 of the 30 children under two years were still being breastfed. Mothers considered the appropriate age for stopping breastfeeding to be around 20 months. Those children who were no longer breastfed had stopped on average at 12 months.

Liquids other than breastmilk, such as unfermented *masato* or *chapo*, were given to the infant during the first few months of life. Thirty-nine percent (n = 12) had received another type of milk in addition to breastmilk. In the majority of cases this was evaporated cow's milk; only one child received an infant formula. The mean age for first giving other milk was eight months.

Physical health assessments: anthropometry

The majority of the mothers (92 percent) had a BMI within the normal range (18.5 to 24.9 kg/m^2); 6 percent were above this range and 2 percent below. However, mean maternal height was low (148.4 cm), similar to that reported elsewhere for the Awajun population (Huamán-Espino and Valladares, 2006) and other Amazon populations (Santos and Coimbra Junior, 1991). The proportion of children under two years with stunting (growth retardation, length for age <-2 SD) was high (43.8 percent), and continued into the older age group as shown in Table 4.8, similar to that reported elsewhere (Huamán-Espino and Valladares, 2006, and Buitrón and Hurtig and San Sebastian, 2004). A smaller proportion of children showed low weight for age (<-2 SD), although this is also higher than the national average. Although there were no children over two years with acute malnutrition (weight for height <-2 SD), 25 percent of children under two years showed undernutrition.

Table 4.8 Indices of Awajun nutritional status for children under 2 years and 2–8 years of age

		Children < 2 years (n=32)	*Children 2 to 8 years (n=32)*
Z-score height/age	Mean	-1.93	-2.20
	sd	1.04	1.12
Z-score weight/age	Mean	-1.01	-1.34
	sd	1.13	0.81
Z-score weight/height	Mean	0.37	0.01
	sd	1.05	0.67
Percent global malnutrition (<-2sd weight for age)		15.6	23.1

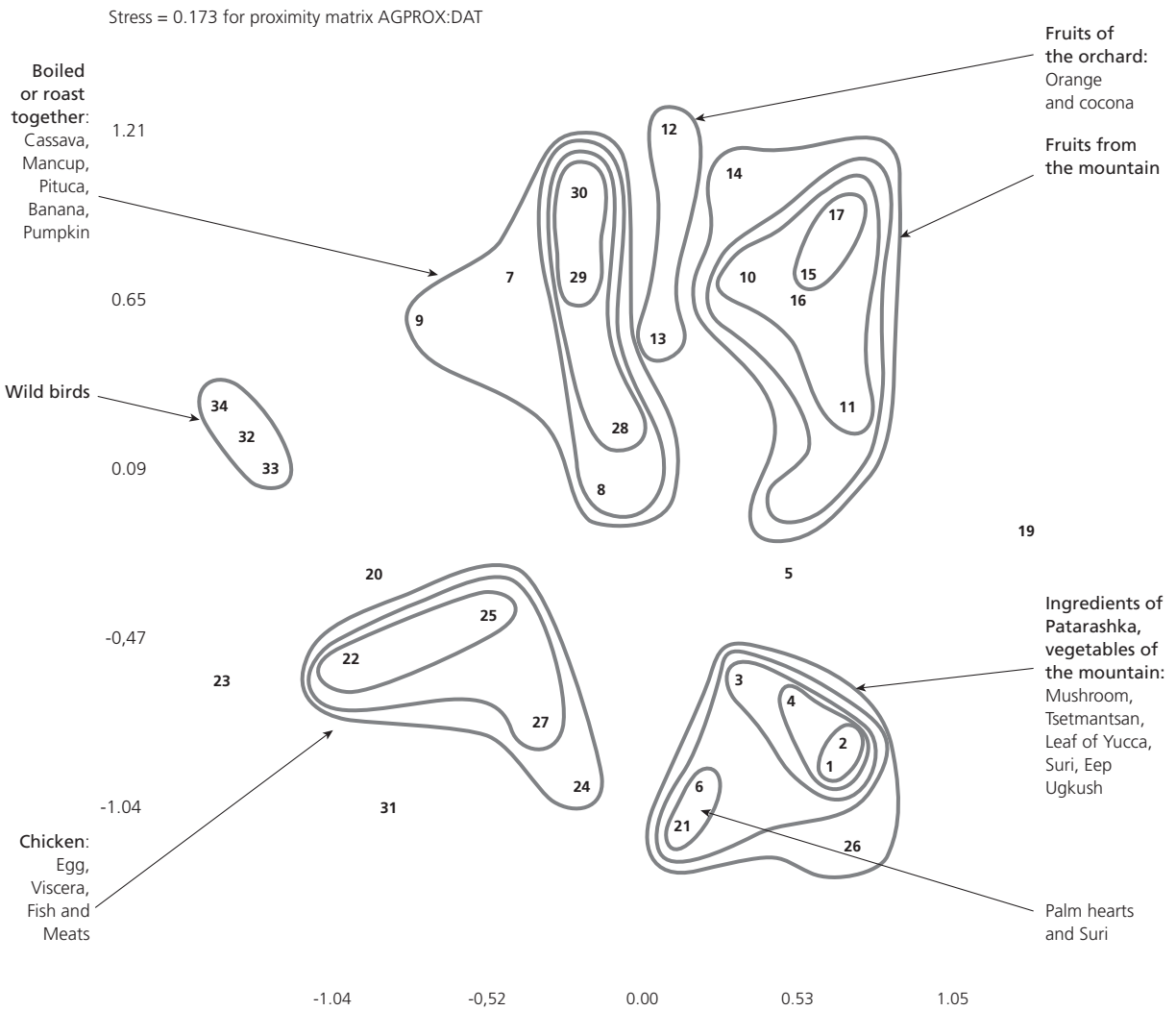
Qualitative information

Pile sorts

Mothers' perceptions of food groups were explored through a pile sort exercise. A diagrammatic representation of this is shown in Figure 4.2.

In this exercise, the main reasons mothers gave for grouping the foods were: (1) how the foods are prepared and which foods are prepared together; (2) the source of the food, for example whether from the wild or whether they grow together; (3) the perceived value of the food; and (4) good taste of the food. The principal food attributes as perceived for young children by the mothers were in relation to their benefit or otherwise for the child, the child's preferences, and source and use of the food. Mothers commented that different foods "are good for growth and development of the body so that the child is not weak", "the food tastes good, it is smooth", "it is eaten daily", "it is boiled or cooked in *patarashka*", "it can harm the child", "it comes from the wild" and "it was used by our ancestors".

Figure 4.2 Multiple dimensional scaling and clustering of foods by pile sort



Legend: **1.** Eep, **2.** Ugkush, **3.** Leaf of Cassava, **4.** Tsemantsan, **5.** Mushroom, **6.** Palm hearts, **7.** Pumpkin, **8.** Cassava, **9.** Banana, **10.** Chupé, **11.** Macambo, **12.** Orange, **13.** Cocona, **14.** Pijuayo, **15.** Aguaje, **16.** Sachamango, **17.** Yarina, **18.** Seed of Macambo, **19.** Peanut, **20.** Pig, **21.** Suri, **22.** Chicken, **23.** Frog, **24.** Fish, **25.** Egg of hen, **26.** Snail, **27.** Viscera of animals, **28.** Pituka, **29.** Manchup, **30.** Sweet potatoe, **31.** Egg of wasp, **32.** Yampis, **33.** Yapagka, **34.** Chipi.

Conclusion

The major dietary sources of the Awajun population of Cenepa were the locally produced, collected or hunted foods (a wide variety) that they traditionally had access to. However, through changes in community living, farming, hunting and collecting patterns not all of these foods were currently available (Huamán-Espino, 2006). The major sources of energy in the diet were the staples: cassava and banana. Intake of animal source foods, particularly meat and fish, was seasonal, but generally low and infrequent and depended on availability. The consumption of vegetables, seeds and fruits was varied and seasonal. The perceptions towards micronutrient-rich foods were mostly very favourable. The main limitation was infrequent consumption

because of availability, replacement by government-donated foods and the small amounts consumed, especially by young children. Infectious diseases and parasites were predominant health problems among this population, and there was a high prevalence of stunting among children.

As a result of this exploration potential nutrient-rich foods have emerged that can be used for intervention to increase both production and consumption, especially for women and young children. Using this understanding of the traditional food system of the Awajun population of Bajo Cenepa, the research group designed interventions to enhance the health, nutrition and well-being of the participating communities through the promotion of key aspects of the traditional food system and culture, working with the community organizations, as well as health and nutrition promoters. A study with the Tsunamé in the Bolivian Amazon indicated that foods high in animal products, access to foraging technology and traditional knowledge of medicinal plants were related to better anthropometric indices of the population (Godoy *et al.*, 2005). The selection of the food-based interventions with the Awajun incorporated these elements. The proposed interventions focused on three principal areas:

1. **Production:** Increase the accessibility of the communities to traditional foods, emphasizing those traditional foods that have high nutritional values. Enhance women's role in food production activities to increase the variety of foods through the collecting and planting of traditional fruits seeds and palms, thus contributing to land protection (and possibly reducing the effects of contamination in fish) (Passos *et al.*, 2003), as well as raising more small animals including *suri* and taking an active role in the fish farms. Involve school children in projects of planting seeds in their schools and learning about the value of traditional foods to reduce the loss of this traditional knowledge among young people.
2. **Education:** Increase knowledge regarding the nutritional value and perceptions towards the importance of, and promotion of, traditional foods in the communities, particularly with school children using the information gained from the qualitative explorations.
3. **Participation and use:** Increase the use of a wide variety of traditional foods through incorporation into food preparations, recipes and diets of the family with special attention to young children to benefit their nutrition.

The information gained from this study, although specific to the Awajun of Bajo Cenepa, contributes to the scarce information available describing the traditional foods and dietary intake of Indigenous Peoples living in the Amazon rain forest. Although differences in food varieties and diet have been reported between different Amazon populations (Milton, 1991), this methodology and its results can contribute to the development of appropriate interventions to preserve the rich traditional food culture and benefit the nutritional and health situation of these populations, who are currently experiencing critical changes in their nutrition and environment ●

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