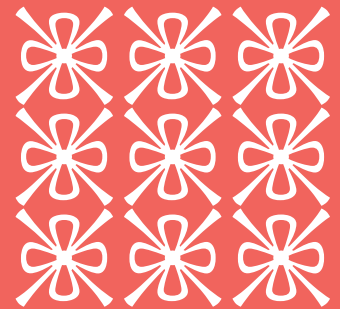




Case studies





Chapter 5

Promotion of traditional foods to improve the nutrition and health of the **Awajún** of the Cenepa River in Peru

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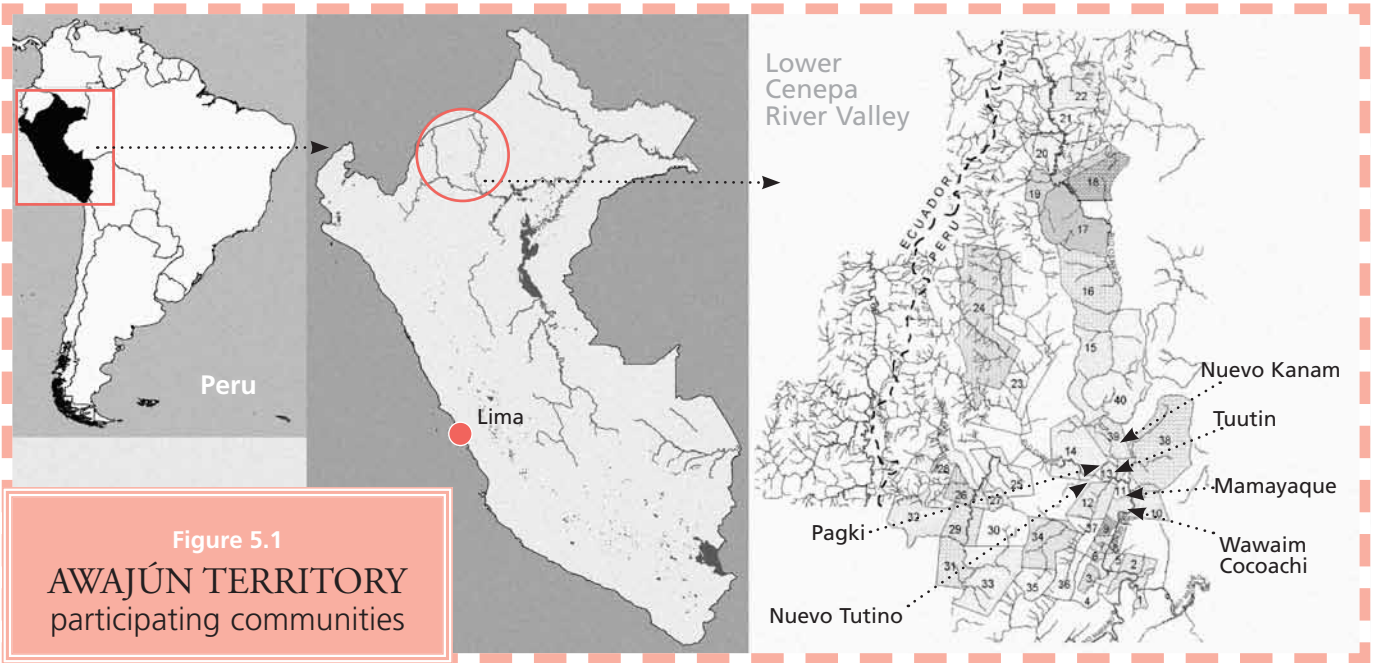


Figure 5.1
AWAJÚN TERRITORY
 participating communities

Data from ESRI Global GIS, 2006.
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Photographic section >> IV

optimum. Studies have found high prevalences of infant and childhood malnutrition (stunting), and anaemia in women and children (Huamán-Espino and Valladares, 2006; Creed-Kanashiro *et al.*, 2009; Roche *et al.*, 2007). Reasons for this include changing ecological, cultural and food systems, and a high prevalence of infections and parasites (Huamán-Espino and Valladares, 2006).

The traditional food system of the Awajún of the Lower Cenepa River is described by Creed-Kanashiro *et al.* (2009) and Roche *et al.* (2007). Based on this information, which was gained through participatory research with the communities, this chapter describes a participatory project to promote the production and use of nutritious traditional foods that benefit the nutrition and health status of the population and preserve its food culture.

Context

Geographic, cultural and demographic characteristics

The district of Cenepa extends from the mouth of the Cenepa River, where it joins the Marañón, across the mountain ranges (*cordilleras*) to the frontier with Ecuador (Berlin and Markell, 1977). It is in the “high jungle” (*ceja de selva*), covered by dense rain forest vegetation, and has a tropical climate. Cenepa was legally recognized in 1941, and comprises three principal areas – Low, Middle and High Cenepa – with a total of 52 communities and an estimated population of 8 000 people (AECI, CIPCA and SAIPE, 2000). It is the only district in the Alto Marañón with no settlers from other parts of Peru.

The Awajún is one of four tribes of the Jivaroan linguistic family (Shell and Wise, 1971). Traditionally, they lived in widely dispersed hamlets, each consisting of several related households. Today the majority reside on or near the region’s major rivers, in communities that range from 13 to 103 families each.¹ Awajún community organizations are headed by an Apu (Chief), with a Vice-Apu, a secretary, a police officer and one other

voting member. The communities of Cenepa have formed the *Organización de Desarrollo de Comunidades Fronterizas del Cenepa* (ODECOFROC, Organization for Development of the Frontier Communities of Cenepa), which represents them within the local area and with the government and other institutions.

Awajún houses are built of local materials, especially canes from local *guayaquil* trees, with roofs of matted palm branches and earthen floors. Most houses do not have a separate area for cooking; the kitchen is part of the common living area. Wood is the principal cooking fuel, and houses are usually lit by candles or petrol burners. People obtain all their water for cooking and washing from the river. This water is not treated and there is no sewage system. However, since the early 1990s, latrines have been installed about 20 to 50 m from the houses.

Transportation and communication among Cenepa communities are mainly by river – in canoes or small motor boats – and on foot, along narrow, steep trails (AECI, CIPCA and SAIPE, 2000). Most communities do not have electricity; the few with a generator use it mainly for radio communication. Few communities have public telephones; some have government health posts, but access to health services is difficult for many; and some have a pre- or primary school, but there is only one secondary school in the area, which takes children from all accessible surrounding communities.

Overall health and nutrition status

The major nutritional and health problems of this population include high rates of childhood stunting, anaemia and heavy intestinal parasitic infection (MINSA/OGE, 2002). A study of schoolchildren aged six to 15 years in the Alta Marañón in 2002 showed that the most common parasites were *Entamoeba coli*, *Lodamoeba butschil*, *Anclystoma/Necator* and *Ascaris lumbricoides* (Ibáñez *et al.*, 2004). In the preliminary study for this chapter, 44 percent of children under two years of age ($n = 32$) and 50 percent of those aged two to 12 years ($n = 39$) were stunted ($< -2SD$ height-for-age) (Creed-Kanashiro *et al.*, 2009; Roche *et al.*, 2007). Twenty-five percent of

¹ www.selvasperu.org



children under two years of age were underweight. National data on the nutrition status of children in the Department of Amazonas, including indigenous and *mestizo* populations (INEI, 2001), reported that 36 percent of those under five years were stunted and 42 percent suffered from anaemia. There are no data on the vitamin A status of this population, although researchers found no signs of the clinical deficiency that is typical in most of Peru. The national data for Amazonas reported high rates of childhood diarrhoea and respiratory infections (INEI, 2001).

The body mass index (BMI) of women in the preliminary study was generally within the normal range (Creed-Kanashiro *et al.*, 2009). Data for the Department of Amazonas (INEI, 2001) indicated that 32 percent of women of reproductive age were anaemic (below 12 g/dl). Psychological health is also a concern for this population, with suicides, particularly of young women, being a public health problem. The suicide rate has declined since implementation of ODECOFROC's Women's Programme, but remains a concern (I. Tuesta, personal communication, 2010).

The traditional food system is based on the major crops of cassava (*Manihot esculenta Euphorb*) and banana (*Musa balbisiana X Musa*), which are the main sources of dietary energy (Berlin and Markell, 1977; Creed-Kanashiro *et al.*, 2009; Roche *et al.*, 2007). Most of the foods consumed are cultivated, collected, hunted or fished locally, and there is a wide variety of local foods; the 2004 research identified a total of 215 local foods (Creed-Kanashiro *et al.*, 2009; IIN, CINE and ODECOFROC, 2005). Foods are prepared by boiling, roasting or smoking. Women make cassava beer and the popular drink *masato*, which is prepared from boiled manioc roots, masticated and fermented. Women also cultivate other roots and tubers and a variety of fruits and seeds in their fields (*chacras*).

Awajún men traditionally hunted for game animals and birds, but overhunting and community living have led to scarcities of these animals near river settlements. There is a wide variety of fish, which has traditionally been the major source of animal food, together with other river creatures such as frogs (*Colostethus*), snails (*Pomácea* sp.) and prawns/shrimp (*Macrobrachius*

brasiliensi). In the mid-twentieth century, missionaries introduced small domestic animals, including chickens (*Gallus gallus*) and pigs (*Sus scrofa*), which are raised mainly by women and provide a potential source of nutrients. Wild fruits, edible larvae (*suris*) and other insects are also collected for food. The consumption of vegetables, fruits and seeds varies by season.

The earlier research into traditional food systems (Creed-Kanashiro *et al.*, 2009) reported changes in the availability and use of traditional foods. Not all the 215 foods identified by participants were currently available, owing to changes in the environment, living and food activity patterns, overfishing, and more difficult access to wild animals. Intake of animal-source foods, particularly meat and fish, was generally low and infrequent, and depended on seasonal availability and hunting patterns. In recent years, the number of foods cultivated has also declined, to one or two varieties of roots and bananas and a few fruits, owing to people's reduced time for working in the fields and the government's donation of foods to families with young children. Nevertheless, relatively few foods were purchased from out of the area or were donated through government programmes.

By exploring the population's food availability, culture and perceptions, the 2004 study provided information about several nutrient-rich traditional foods that could be promoted through interventions to increase both production and consumption, especially among young children and women, thereby benefiting the nutrition and health status of the population.

Rationale

The project described in this case study was built on the participative research and results of the 2004 study, and was designed to enhance the nutrition, health and well-being of participating communities – especially women and children – through the promotion of key aspects of the traditional food system. It was delivered through close work with community organizations and community health and nutrition promoters, and focused on activities in three principal areas:

- **Food production:** Stimulate feasible production activities to increase the accessibility of traditional foods, emphasizing those with high nutritional value. Enhance women's roles in collecting and planting traditional fruit seeds and palms, raising small animals including *suri* (larvae) and participating in fish farms. Involve primary schoolchildren in seed planting projects. Promote full use of existing agricultural land, to avoid losing it to government appropriation.
- **Education:** Increase knowledge about the nutritional value, importance and worth of traditional foods within the communities and among schoolchildren, to maintain and recuperate the use of traditional foods and ensure that knowledge is not lost to future generations.
- **Participation and use:** Increase the use of a wide variety of traditional foods through activities in food preparation, recipes and diet, with special attention to young children and their nutrition.

Methodology and activities

Preparation for the participatory project

In 2005, the 2004 study results, the food list, composition information about 82 of the 215 traditional foods identified, and the project proposal were presented at the ODECOFROC assembly of representatives of the 52 communities. The project research agreement was signed, and the food composition information was distributed to ODECOFROC leaders, the Women's Programme and the six communities that participated in the earlier study. Contacts and agreements made previously with participating communities were renewed. Approval was obtained from the Ethics Committee of Peru's Institute of Nutrition Research (IIN – *Instituto de Investigación Nutricional*) and the Institutional Review Board of McGill University in Canada. All the people interviewed in the baseline and final evaluations or photographed for educational materials provided their prior consent.

The following subsections describe the methodology, results, monitoring and evaluation of project activities.

Intervention activities

Following the baseline evaluation in February 2006, a variety of activities were implemented over a two-year period to 2008, several of which were proposed by Kuhnlein *et al.* (2006). Project activities started with the training of 32 community nutrition and health promoters from 16 Cenepa River communities, who were elected by their communities and coordinated through the ODECOFROC Women's Programme to promote activities and messages in their own communities. Figure 5.1 on p. 54 shows the distribution of the communities along the Cenepa River.

Participation was voluntary. Most of the communities with reasonable access to the ODECOFROC centre (within two days of river travel) were invited to participate in the training, and all those that were interested were included. Activities were also conducted with pupils, parents and teachers of five local primary schools. The project focused on food production and empowerment, and included education and training activities on food, nutrition and cultural topics to support the promoters' role as nutrition and health leaders in their communities; these were the topics requested by the population. Activities were based on participatory workshops held twice a year in Cenepa and led by the IIN technical team, with follow-up and support through periodic community visits by the local Awajún health and nutrition team led by the ODECOFROC Women's Programme, which also provided translation from Spanish to Awajún when necessary.

Promotion and creation of plant nurseries and recuperation of traditional seeds

Production activities were an essential part of the intervention, and were conducted primarily by specialist plant cultivation and animal raising institutions. To support the conservation, recuperation and diversification of traditional plants, especially food plants for family use, the Women's Programme led an initiative involving the community nutrition and health promoters in collecting seeds and establishing plant and forestry nurseries in the communities. Training in

appropriate management of these resources was provided by a forestry agriculturist at two workshops for the 32 promoters and at primary schools for 146 children and adolescents. A model/central nursery was created at the ODECOFROC centre, providing a source of seedlings for community and family nurseries. The Women's Programme maintained the central nursery and managed seedling distribution, while schoolchildren were responsible for their school nurseries.

In addition to the central nursery, five community nurseries were established. Table 5.1 lists the 16 seedling types planted at the central nursery. Fifty-seven mothers participated in community meetings organized by the promoters and the Women's Programme, receiving seedlings from the central nursery during the project, mostly of fruit and palm trees. Seeds of other vegetables, trees and medicinal plants were exchanged among communities.

Table 5.1 Inventory of plants at the central nursery, 2008

| Local name | Scientific name | Tree type | No. of plants |
|----------------|---------------------------------|-------------|---------------|
| Huasai | <i>Euterpe oleracea</i> | Palm tree | 230 |
| Ungurahui | <i>Oenocarpus bataua</i> Mart. | Palm tree | 113 |
| Naranja | <i>Citrus aurantium</i> L. | Fruit tree | 52 |
| Macambo | <i>Theobroma bicolor</i> Humb | Fruit tree | 123 |
| Huevo de toro | – | Fruit tree | 340 |
| Pijuayo | <i>Bactris gasipaes</i> H.B.K. | Palm tree | 130 |
| Caimito | <i>Pouteria caimito</i> | Fruit tree | 24 |
| Namuk | <i>Sicana odorifera</i> | Fruit tree | 9 |
| Chonta | <i>Bactris setulosa</i> | Palm tree | 27 |
| Huacrapona | <i>Iriartea deltoidea</i> | Palm tree | 11 |
| Sampi | <i>Inga</i> sp. | Fruit tree | 41 |
| Naampi | <i>Caryodendron orinocensis</i> | Almond tree | 53 |
| Naam | <i>Caryodendron orinocensis</i> | Fruit tree | 46 |
| Cedro | <i>Cedrela odorata</i> L. | Forestry | 4 |
| Cedro rosado | <i>Cedrela odorata</i> L. | Forestry | 25 |
| Bolaina blanca | <i>Guazuma crinita</i> | Forestry | Seedlings |

Table 5.2 Numbers of families with food production activities, by community

| Community | No. of families in community | Fish ponds | Chickens | Guinea pigs | Pigs | Ducks | Turkeys | Cows |
|--------------|------------------------------|------------|----------|-------------|------|-------|---------|------|
| Bashuim | 59 | 14 | 18 | 3 | 2 | 3 | 4 | NA |
| Nuevo Tutino | 27 | 16 | all | 3 | NA | NA | NA | NA |
| Mamayaque | 75 | 30 | all | 1 | NA | NA | NA | 7 |
| Tuutin | 50 | 47 | all | 2 | NA | NA | NA | NA |
| Kusu Pagata | 103 | 64 | 56 | 20 | 1 | NA | NA | NA |
| Cocoachi | NA | 10 | all | NA | NA | NA | NA | NA |
| Nuevo Kanan | 25 | 25 | NA | NA | NA | NA | NA | NA |
| Canga | 87 | 5 | 40 | NA | 2 | 4 | NA | 1 |

NA = No information available.

Source: Numbers of families from www.selvasperu.org

Workshops on raising fish and chickens

Community nutrition and health promoters and Awajún leaders received training in other parts of Peru and then held workshops on establishing and managing community or family fish ponds appropriate for local geographic conditions, and on raising chickens; both workshops were facilitated by the Women's Programme. The *Servicios Agropecuarios para Investigación y Promoción Económica* (SAIPE, Agrofisery Service for Economic Research and Promotion) Peru and the World Wide Fund for Nature (WWF) provided technical assistance for the fish ponds, and the project provided building materials. These initiatives complemented and reinforced production activities promoted by other agricultural institutions working in coordination with ODECOFROC and the communities.

By the end of 2008, there were an estimated 400 family fishponds in 32 Cenepa River communities. However, several of these were precarious and were not in continuous production, and there was demand for further technical and material assistance. Table 5.2 shows the animal production activities in the eight communities included in the monitoring of this intervention.

Food, nutrition and culture workshops

Four nutrition workshops were held over the two-year project period, focusing on the sharing of knowledge and experiences of local foods and their nutritional contributions, uses and preparation, and highlighting their positive characteristics, diversity and cultural identification. Special efforts were made to find ways of improving infant and young child feeding and nutrition using locally available foods, owing to concerns about the high prevalence of growth retardation observed in the 2004 study and baseline evaluation. The following topics were included in the workshops and reinforced during the project period:

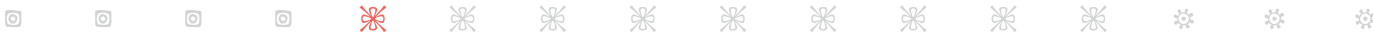
- traditional local foods;
- food combinations for a balanced diet;
- infant and young child feeding and nutrition;
- feeding of preschool and schoolchildren;
- nutrition for pregnant and lactating women;

- care in food manipulation, hygiene and use of water;
- production and conservation of foods, from the field to the table: local and traditional foods versus market foods, traditional conservation methods;
- illnesses that result from not eating well (e.g. diabetes, hypertension).

Practical and participatory sessions included song, story and socio-drama creations, hand-washing classes, and elders' stories about their experiences and practices in the past. During the training, community nutrition and health promoters developed four or five key messages for each topic, and then promoted the most appropriate of these within their communities. This resulted in:

- 29 educational messages for dissemination in the communities by local radio and loudspeaker;
- three food/nutrition promotion posters;
- two songs in Awajún, disseminated in two primary schools;
- ten stories about good foods and hygiene, based on traditional stories;
- three socio-drama representations showing traditional good habits and customs reinforced with current knowledge;
- 58 food preparations (recipes) for infants and young children, which included animal products and other traditional foods such as cassava, *sachapapa* (*Dioscorea trifida*), *pituca* (*Colocasia esculenta*), *eep* (*Araceae philodendron* sp.), *ugkush* (*Piper* sp.) and palm hearts (various species) prepared in traditional ways, such as *patarashka* (steaming in banana leaves), smoking and boiling;
- preparation of lunch baskets for schoolchildren;
- a T-shirt designed by the promoters and distributed to them, the *Apus* and community leaders, with the message "Eating our own foods we shall be intelligent, strong and happy" written in Awajún.

To enhance dissemination of the nutrition messages, traditional foods and preparation methods were included in a cultural festival of traditional songs, dances and practices held by ODECOFROC, in which all the Cenepa River communities participated.



Workshop for the empowerment of promoters as community nutrition and health leaders

In 2007, the community promoters reported difficulties in transmitting the information and experiences they had obtained through the workshops, particularly regarding the organization and holding of community meetings to promote nutrition. In response, the Women's Programme coordinated a "Reflect-Act" workshop, led by an experienced educator, to facilitate the community promoters' role. At the workshop, the promoters reflected on their strengths, such as their own firm commitment; the recognition they received from their communities, including support from Apus and the community assembly; the population's enthusiasm about the production activities; and the valuable nutrition workshops and visits from the Women's Programme.

These discussions strengthened the promoters' self-esteem and emphasized the value of working in teams of two – often one woman and one man – in each community, to support each other. (There were 19 male promoters and 13 female.) The practical aspects of promoters' nutrition activities were reinforced, such as interpersonal communication through visits to individual families, the use of food preparations to illustrate messages, and the many opportunities for mentioning nutrition messages and practices, even briefly (e.g., when washing at the river, and at community assemblies).

Monitoring of project activities

Community activities were monitored throughout the two years of the project, usually by a nutrition promoter who had received special training in coordination with the Women's Programme and IIN. Three monitoring visits were made to each of the participating communities in Middle and Lower Cenepa, but it was not easy to visit communities higher up the Cenepa River owing to the difficulties and costs of transport. The project provided the Women's Programme with a canoe and outboard motor but the limited availability and high cost of fuel resulted in fewer visits than planned.

Six communities of Lower Cenepa were visited by the principal monitor, who obtained information about the activities implemented and mothers' perceptions about these, through observation and interviews with mothers, Apus and community promoters. These monitoring activities were complemented with information from the President of ODECOFROC and the community promoters attending workshops.

Tables 5.1 and 5.2 show the numbers of nurseries created, seeds sown, fish ponds operating and families raising small animals reported by the Women's Programme, ODECOFROC and promoters in 2008. The monitor visited eight cultivation areas in four communities, and noted that these families were cultivating a wider variety of food plants near to their homes. Fruit and palm trees were the most common crops, and all the families had used seeds (of eight different plants) that their promoters had brought from the central nursery, as well as those that they themselves had collected from the wild and from more distant fields. Mothers spoke positively about this activity, and commented that having these foods nearer to hand had benefited their families and made it easier to have food variety during rainy seasons, when reaching their main fields was difficult.

Of the 25 mothers interviewed in the six communities of Lower Cenepa, ten reported having a fish pond and consuming fish more frequently, thereby improving their families' diet; another ten expressed their intention to build a pond. Almost all the mothers (22) were raising chickens for family consumption. Seven reported improved feeding patterns for their families and children, through having a wider variety of foods in their diets, with more frequent use of animal products. Only four mentioned receiving information on infant feeding, advising them to feed infants breastmilk exclusively for the first six months, introduce the first complementary foods at six months, give foods of a thick consistency using local ingredients, and include animal products.

Evaluation

To evaluate the impact of the project on knowledge, practices and nutrition status a survey was conducted among mothers with small children before

and after the project period, in February 2006 and February 2009, respectively.

The difficult socio-political situation of the Awajún in defending their territories from government appropriation and the arrival of resource extraction industries made it impossible to implement or evaluate activities in the second half of 2008 (AIDSESP, 2010).

Methodology

The baseline evaluation was conducted in six Lower Cenepa communities – Mamayaque, Tutino (Tuutin), Nuevo Kanan, Nuevo Tutino, Wawaim and Cocoachi – and the final evaluation in all except Wawaim and Nuevo Tutino, owing to their distrust of evaluation teams as a result of the socio-political situation.

The following information was collected from mothers in both evaluations:

- socio-demographic characteristics of the family and household;
- current and past health information about the mother and child/children;
- food security, using a version of the United States Department of Agriculture (USDA) Food Insecurity and Hunger Module (Vargas and Penny, 2010) adapted for Peru by IIN;
- consumption frequency of 30 traditional foods, selected for their nutritional value from the preliminary investigation of the traditional food system (Creed-Kanashiro *et al.*, 2009);
- dietary intakes of the mother and child/children from 24-hour recalls on two non-consecutive days; portion sizes were determined by scales measuring up to 5 kg with accuracy of ± 1 g;
- physical activity of the mother, using a short version of the International Physical Activity Questionnaire (IPAQ, 2002);
- anthropometry measurements of the mother and child/children, using a height/length board made locally, and bathroom scales measuring up to 150 kg with accuracy of ± 500 g; mothers were weighed with and without the child to assess the child's weight.

For the final evaluation, the following additional parameters were assessed:

- knowledge about nutrition and food production;
- activities of the mother, using an adaptation of the “Home questionnaire for child” (M. Penny, personal communication, 2008), in which mothers were asked to place small balls in containers representing each of their activities; the number of balls assigned to each container depending on the amount of time spent on that activity.

The evaluations were conducted in each community on three non-consecutive days, after consultations between the Apu and members of the Women's Programme. Each interview lasted about two hours and each IIN evaluator was accompanied by a trained translator.

Data analysis

Baseline and final survey data were entered into Visual FoxPro version 8 and analysed using SPSS version 17. Individuals' traditional food diversity scores (TFDS) (Roche *et al.*, 2008) were calculated by assigning 1 point to each local food reported in the 24-hour diet recalls.

Nutrient and energy intakes were also calculated from the food intakes reported in the 24-hour recalls, using IIN's food composition tables (IIN, 2001) complemented with information from other food composition tables where necessary. If the composition of a particular food was not known, that of a similar food was assigned instead. This was done for 18 foods: three fish, three birds, four wild animals, three leafy vegetables and four fruits.

International recommended intakes were used to assess the adequacy of women's and children's intakes (FAO/WHO/UNU, 2004; 2007; FAO/WHO, 2002; Dewey and Brown, 2003). Energy requirements for moderate activity were considered for the women, to account for their agricultural activities.

Comparisons between the baseline and final evaluations were analysed using Mann-Witney non-parametric tests for each variable except for TFDS, for which ANOVA was used.



Results of baseline and final evaluations

Mothers with children younger than five years of age were invited to participate in the evaluations. The difficult socio-political situation meant that fewer families were able to participate in the final evaluation than in the baseline. Numbers of participants in each community are shown in Table 5.3.

Of the 41 families included in the final survey, 14 mothers had also participated in the baseline. Ten children were in both the baseline and final surveys, having been under two years at baseline and in the two-to-five-years age group in the final survey. Within each family, all the children under five years of age were included in the evaluation. The age distributions of the children differed significantly between the two surveys, as shown in Table 5.4 ($p = 0.016$). There were fewer children in younger age groups in the final survey and the mean age was 4.3 months older.

Family characteristics

Most characteristics of households and families were similar in the baseline and final surveys, indicating that although the sample was smaller in the final evaluation, the populations were comparable. Most of the families surveyed lived in their own houses (75 percent baseline, 85 percent final); others lived in relatives' houses. The majority of mothers lived with their married or common-law husbands (89 percent baseline, 80 percent final); others were single, separated or widowed. Most families lived as a nuclear family (70 percent baseline, 80 percent final); the remainder shared their homes with their extended families. On average, six family members lived together in a house of two rooms.

The mean age of the mothers was 25 years at baseline and 29 years in the final survey. The mean number of years of education was six, indicating completion of primary school. At baseline, 4.8 percent of mothers had no schooling and 63 percent had some primary school education. In the final survey, these figures were 7.7 and 54 percent, respectively. The majority of mothers in both baseline and final surveys reported working in their own fields as their

major occupation (86 percent) as well as caring for their families, and 8 percent worked principally in the fields of others. Some mothers reported doing artisan work in the final survey (13 percent).

Knowledge about foods and nutrition

The surveys explored the changes in mothers' knowledge and attitudes resulting from the community health and nutrition promoters' education activities. At baseline, 47 percent of mothers reported having received advice related to food and nutrition, and 16 percent had attended an education session on the subject. In the final survey, 62.2 percent reported having received advice about nutrition, mainly from a promoter in the Women's Programme. The topics most remembered were infant and young child feeding, with mention of specific infant preparations, and how

Table 5.3 Numbers of families participating in baseline and final evaluations

| <i>Community</i> | <i>Baseline</i> | <i>Final</i> |
|------------------|-----------------|--------------|
| Mamayaque | 10 | 16 |
| Tutino | 20 | 5 |
| Wawaim | 7 | 0 |
| Nuevo Kanan | 9 | 10 |
| Nuevo Tutino | 8 | 0 |
| Cocoachi | 10 | 10 |
| Total | 64 | 41 |

Table 5.4 Age distributions of children in baseline and final surveys

| <i>Age group</i> | <i>Baseline</i> | <i>Final</i> |
|----------------------|-----------------------|-----------------------|
| 0–5.9 months | 10 | 1 |
| 6–11.9 months | 16 | 7 |
| 12–23.9 months | 27 | 13 |
| 2–3 years | 15 | 8 |
| 3–4 years | 11 | 8 |
| 4–5 years | 3 | 5 |
| Total | 82 | 42 |
| Mean age of children | 23.7 ± 12.8 months | 28.0 ± 15.3 months |

to have a balanced and varied diet using local foods. Forty-nine percent of mothers reported putting the advice into practice.

Traditional and market foods

Mothers were asked about their knowledge and perceptions regarding traditional local food and market or donated foods from outside the area. At baseline, mothers reported that traditional foods were good (80 percent), natural (41 percent) and good for children and families (16 percent). In the final survey, more mothers mentioned that traditional foods were good for health (34 percent), natural and without chemicals (29 percent). Mothers mentioned their suspicion that market foods may contain chemical contamination – especially the canned foods distributed through government programmes – and thought that their traditional foods were better. However, they also mentioned certain foods from outside as good complements to the diet and useful in times of scarcity. Other market foods, such as sodas, biscuits and sweets, were recognized as not being healthy foods.

Regarding traditional foods, women stated that “they are natural, we know they do not contain chemicals”. Regarding market foods they reported “we don’t know what we are buying”.

At baseline, 73.4 percent of mothers reported that the number of traditional food species to which they had access was diminishing over time, and mentioned specifically that animals were further away from communities: “before there were trees and animals near, now there aren’t”. In the final survey, 58 percent mentioned that the number of species had diminished, and 21 percent said it was increasing, as people were cultivating more foods: “before there were more foods, now there is more population and so there is scarcity, but we are now sowing in our fields”; “before we didn’t sow much, we only collected from the wild, but now we are bringing plants from the wild and sowing them in our fields”.

Mothers’ feeding practices for children

The final survey included questions about knowledge of feeding practices. Eighty-nine percent of mothers said

that breastmilk was the first food to be given to a baby and the only food to be given for the first six months of life: “the baby’s stomach is not yet developed and breastmilk is what the baby needs for development”.

Forty-six percent of mothers said that the first complementary food should be introduced to a baby at six months of age, while 43 percent said this should occur at more than six months, as “[babies] will only then start to be hungry”, “they do not know how to eat before this” or “[this is] when the teeth come”. The mothers use these milestones as they do not necessarily keep precise track of their children’s ages. Most mothers (76 percent) said that the first food should be thick food and fed after six months, according to the advice they had received on good infant feeding practices. Sixteen percent of mothers said that meat can be given at six months of age (the message given), but the majority (73 percent) considered that it should only be given at seven months or older, when the infant has teeth and is thus able to chew. Only 24 percent of mothers reported making food preparations specifically for their infants and young children.

The education sessions included nutrition for primary schoolchildren, especially regarding foods to be taken to school, as children generally only took cassava and banana to eat during the school day. In the final survey, 74 percent of mothers said that the lunch box should consist of a mixture of foods, including egg, fish and fruits, as well as the staples.

The education sessions also promoted healthy diets for pregnant and lactating women. In the final survey, 60 percent of mothers responded appropriately about the foods needed by pregnant women, with 68.5 percent stating that a lactating mother needs to eat more food of greater variety as “her body needs more”.

Food production activities

Half of the mothers interviewed in the final survey had heard about producing food, cultivating seeds or raising small animals and fish ponds from the promoters of the Women’s Programme and from other institutions supporting these activities in the area. Of these mothers, 86 percent reported that they had begun to raise chickens, 69 percent had established a household garden and planted

seeds, and 44 percent had established a fish pond and were raising fish, mainly tilapia (*Tilapia melanopleura*). Thirty-eight percent of the mothers said they were now eating foods that they did not formerly eat. Of these mothers, 43 percent were eating new foods they produced or hunted themselves, 14 percent were eating new market foods, and 43 percent were eating both.

Eighty percent of mothers in the final survey said they preferred using their own produce to feed their families. They gave the following reasons:

- “They are the nicest tasting foods, as well as more healthy.”
- “They are better quality because they are grown without fertilizer.”
- “They are not contaminated, they are natural.”
- “The plants are ours, they are not watered by others, we can eat them confidently, including without washing them.”
- “I don’t have money to buy, but I have my own land anyway so I can sow my food.”
- “I don’t need more food, I have sufficient.”

Table 5.5 Numbers of different foods consumed in baseline and final surveys (24-hour recall)

| | Baseline | Final |
|-------------------------------------|------------|-----------|
| No. of families | 64 | 41 |
| Local/traditional foods | 76 | 72 |
| Market foods (from out of the area) | 25 | 25 |
| Total foods | 101 | 97 |

Table 5.6 Traditional food diversity scores (24-hour recall)

| | n | Mean (± SD) | Range |
|------------------------|----|--------------------------|-------|
| Baseline survey | | | |
| Women | 64 | 9.4 ± 3.39 | 3–18 |
| Children | 67 | 8.1 ± 3.63 | 1–18 |
| Final survey | | | |
| Women | 40 | 10.7 ± 3.62 ¹ | 4–17 |
| Children | 42 | 10.1 ± 3.72 ² | 0–18 |

¹ Women, difference between baseline and final $p = 0.04$.

² Children, difference between baseline and final $p = 0.01$.

- “Foods that we produce are free.”
- “When you grow them and they are there you can eat them anytime.”
- “We can vary our foods.”

Food diversity

Table 5.5 shows the total numbers of foods consumed by families, as reported in their two 24-hour recalls for the baseline and final surveys. Although fewer families were included in the final than in the baseline survey, the total numbers of foods consumed were similar, at 101 and 97 respectively. The numbers of traditional/local and market foods were also similar, indicating that food variety and the use of local foods were maintained during the project period in spite of the introduction of more market foods into the area.

Traditional food diversity score

The TFDS indicating the number of traditional foods consumed by each individual in the 24-hour recalls are shown in Table 5.6. There were significant increases in the TFDS for both women and children after the project, showing that the use of traditional foods was maintained or increased.

Frequency of food consumption

The frequency of consumption of 30 traditional foods was explored in both surveys. In general, the consumption of seasonal local fruits was reported to have increased in the final evaluation, which recorded frequent consumption of *carotene aguaje* (*Mauritia fleuxosa Palmae*), *pijuajo* (*Bactris gasipaes*) and *sachamango* (*Grias Peruviana* Miers. [Lecythidaceae]). Traditional vegetables promoted during the project were eaten more frequently (weekly as opposed to monthly at baseline) as were some wild animals, such as frogs and wild pigeons, and organ meats. Children aged six to 12 months consumed fish more frequently, with 50 percent consuming it weekly after the project, compared with 23.5 percent at baseline; this was an effect of the family fish farms.

Food security

The food security questionnaire that is generally used to derive a score for food insecurity (Vargas and Penny,

2010) was used. However, some of the questions were difficult to apply with the Awajún population, as they sounded similar or repetitive to both the translators and the mothers; the following results are therefore derived from only some of the questions on the questionnaire and are not total scores.

When asked about the food available in their homes during the past year, most mothers reported that they had sufficient, but not always what they would like (67.2 percent baseline, 60.5 percent final). Thirty percent at baseline and 34 percent in the final survey said they sometimes did not have sufficient food, but only 4 percent reported that this situation occurred frequently. The main reasons given were the scarcity of food in their fields at certain times and the difficulty of obtaining foods they would like, such as by hunting animals from the wild. In response to this situation, about 40 percent of mothers said that they sometimes gave less food to their children, but 86 percent at baseline and 95 percent in the final survey said their children never went without food. In both the baseline and final surveys, 90 percent of mothers said they were sure of their food supply for the whole year.

The respondents' principal concerns regarding food supply were that they may not have new fields to cultivate (19 percent baseline, 29 percent final) or access to quality foods (16 percent baseline, 13 percent final). Only 8 percent at baseline and 13 percent in the final survey mentioned uncertainty about whether or not they would have sufficient money for food. Mothers reported that when they lacked sufficient food at home, they collected it from their fields (67.2 percent baseline, 60.5 percent final), hunted animals in the wild (10.9 percent baseline, 12.1 percent final) or ate only cassava (12.5 percent baseline, 10.5 percent final). Obtaining food on credit from shops was mentioned by 5 percent in the final survey.

Mothers reported that they obtained their food mainly from their fields (93.8 percent baseline, 80 percent final); the use of money was mentioned by 3.2 percent at baseline and 20 percent in the final survey, indicating that purchasing food from others or from small local shops may have become more

common during the project period, as evaluated in this small and non-representative sample. Ninety-two percent of mothers at baseline and 80 percent in the final evaluation reported sharing food with their neighbours.

Families' participation in government social programmes

The government has several social programmes, mainly distributing food for populations classified as poor or extremely poor; Table 5.7 shows family participation in these as reflected in the evaluations. The Glass of Milk programme distributes canned milk or fortified milk powder from the municipality, for children aged six months to seven years and pregnant and lactating women. The community kitchens programme is run by the National Programme for Food Assistance of the Ministry of Women and Social Development and distributes foods such as beans, oil, rice and canned fish, which are prepared in community kitchens. JUNTOS is a conditional cash transfer programme implemented by the government for families classified as living in extreme poverty; it started in the Cenepa area in May 2008. Mothers of children under 14 years of age receive PEN (*nuevos soles*) 100.00 (approximately USD 35.00) a month on condition that their families take part in health, nutrition and education activities and that they present identity documentation for their children.

More than half of the families interviewed participated in a social programme, and participation generally increased over time (Table 5.7). Foods distribution to the Glass of Milk and community

Table 5.7 Participation in government social programmes in baseline and final surveys

| Programme | % of population participating in social programme | |
|-------------------------|---|-------|
| | Baseline | Final |
| All programmes | 59.4 | 64.1 |
| Glass of Milk programme | 42.2 | 61.6 |
| Community kitchens | 42.2 | 18.0 |
| JUNTOS | - | 66.7 |

Several families participated in two or three programmes.



kitchens programme were not regular, owing to slow administration and the relative inaccessibility of the area, so participation in these programmes was reported to be variable. Mothers reported using the money received from JUNTOS to purchase school supplies for their children, market food and medicines.

Forty-seven percent of families at baseline and 29 percent in the final survey reported that their children had received foods from a community kitchen in the previous months. The principal reasons given were that it was a free government programme and that children “like to eat rice”, a commonly served food. Those who did not participate said it was because they did not have this facility in their community. About half of the families reported that their children received milk from the Glass of Milk programme, but not all the time, only when it was available. The principal reason given was that milk is a good food for children and complements their diet (27 percent baseline and final); in the final survey 32 percent said it was assistance from the government. Those who did not receive milk said that the programme did not reach their communities – particularly at baseline, 27 percent compared with 5 percent in the final survey – while a few reported that their children did not like milk or the programme (12.5 percent baseline, 8 percent final).

Infant feeding patterns

All mothers reported breastfeeding their children, and breastmilk was the first food or liquid received by 95.3 percent of children at baseline and 97.4 percent in the

final survey, indicating that this was a prevalent practice and was reinforced during the project. Breastfeeding prevalence is shown in Table 5.8. Of the 11 children in the youngest age group at baseline, four (36 percent) were exclusively breastfed. However, as shown in Table 5.8, breastfeeding during the second year of life was not a common practice, and needs to be stressed in future interventions. Mothers said they breastfed because it was what they were taught to do by their elders, and must be good. Their reasons for stopping breastfeeding were that their children had teeth and bit their nipples, they felt they did not eat good enough food to be able to breastfeed, or they became pregnant with the next baby.

In the surveys, 85 percent of children had received water, infusions and *chapo* (a drink made from banana) as well as breastmilk. The mean age for introducing liquids was 6.5 months at baseline and nine months in the final survey, indicating that the timing for introduction was delayed after the project. Thirty-seven percent of children at baseline and 48.7 percent in the final survey had received milk other than breastmilk; the mean ages for introducing other milk were 8.9 months at baseline and 10.6 months in the final survey. Feeding bottles were used to give liquids to infants. *Masato* (a pre-masticated drink prepared from cassava) was given to 58 percent of infants at baseline and 67 percent in the final survey. The mean ages for introducing *masato* were 9.7 months (ranging from three to 24 months) at baseline and 13.2 months (six to 36 months) in the final survey. The *masato* given to young children is fresh (i.e., unfermented) and is considered good for young children as it can satisfy hunger, forms stools and – together with *chapo* – makes the child “chubby”.

The average ages at which mothers reported first feeding their infants solid foods were five months at baseline (ranging from one to nine months) and 6.6 months in the final survey (four to eight months), showing reduced incidence of very early introduction of solids. The most common first foods given were watery broths or soups, and boiled banana and cassava, which were mashed or pre-masticated to make them soft and prevent the child from choking. Consumption of pre-

Table 5.8 Breastfeeding in baseline and final surveys, by age group

| Age group | Baseline n | % | Final n | % |
|----------------|---------------|-----|------------|-----|
| 0–5.9 months | 11 | 100 | 1 | 100 |
| 6–11.9 months | 16 | 94 | 8 | 88 |
| 12–23.9 months | 27 | 41 | 12 | 17 |
| 2–3 years | 15 | 6 | 8 | 0 |
| > 3 years | 14 | 6 | 13 | 0 |

Table 5.9 Median percentages of daily recommended energy and nutrient intakes among young children

| Nutrient | Infants and children 6–23 months | | | Children 2–5 years | | |
|---------------------------------|----------------------------------|--------|---------|--------------------|--------|---------|
| | Baseline | Final | p value | Baseline | Final | p value |
| | n = 38 | n = 19 | | n = 29 | n = 23 | |
| Energy | 116 | 109 | ns | 122 | 118 | ns |
| Protein | 179 | 256 | 0.064 | 182 | 178 | ns |
| Vitamin A | 93 | 167 | 0.056 | 232 | 200 | ns |
| Ascorbic acid | 297 | 405 | ns | 350 | 404 | ns |
| Thiamin | 79 | 103 | ns | 120 | 138 | ns |
| Riboflavin | 115 | 156 | ns | 239 | 190 | ns |
| Folate | 149 | 116 | ns | 99 | 93 | ns |
| Iron | 45 | 55 | ns | 62 | 83 | ns |
| Zinc | 49 | 80 | ns | 99 | 81 | ns |
| Calcium | 31 | 33 | ns | 56 | 43 | ns |
| Dietary characteristics | | | | | | |
| % energy from protein | 7.4 | 10.3 | 0.009* | 6.5 | 7.1 | ns |
| % energy from fat | 7.8 | 13.8 | 0.015* | 6.3 | 7.5 | ns |
| % energy from carbohydrate | 89.0 | 75.3 | 0.023* | 90.0 | 88.3 | ns |
| % protein from animal sources | 37 | 65 | 0.004* | 28 | 41 | ns |
| % iron from meat, fish, poultry | 4.4 | 27.0 | 0.003* | 5.2 | 11.3 | ns |
| % zinc from animal sources | 16.6 | 60.2 | 0.001* | 11.3 | 31.6 | ns |

* Controlled for age owing to the difference in age distributions of children 6–23 months between the baseline and final evaluations.

masticated foods is discouraged by health personnel, and was reported less frequently in the final evaluation. The introduction of meat, commonly pre-masticated or mashed, was reported to occur at a mean age of 7.3 months at baseline compared with 6.5 months after the project. Twelve percent of children at baseline and 8 percent in the final survey had received an iron supplement at the health post to treat or prevent anaemia. In general, these results, and the interviews with mothers who reported using varied complementary food combinations, demonstrated improved complementary feeding practices after the project.

Energy and selected nutrient intakes

Tables 5.9 and 5.10 show the adequacy of energy and selected nutrient intakes for two age groups, compared with recommended intakes and calculated from the 24-hour recall data from the baseline and

final evaluations. There was wide variability in intakes, so the tables present median values. Median intakes for children in both age groups met the recommendations for energy, protein, vitamins A and C, riboflavin and folate. However, median intakes for iron, zinc and calcium were well below recommendations, and although intakes of iron and zinc (in the younger group) appear to be higher after the project, they were still below recommended intakes. After the project, for all nutrients, the proportions of children consuming less than 80 percent of the recommended intake were lower than at baseline.

The energy contributions from protein and fat were low, but increased significantly in the youngest age group after the project, owing to the increased consumption of animal-source foods. The proportions of protein, iron and zinc from high-bioavailable animal sources also increased in this age group.

Table 5.10 Median percentages of daily recommended energy and nutrient intakes among lactating and non-lactating mothers

| Nutrient | Lactating mothers | | Non-lactating mothers | |
|---------------------------------|-------------------|-------------------|-----------------------|--------|
| | Baseline | Final | Baseline | Final |
| | n = 36 | n = 11 | n = 22 | n = 25 |
| Energy | 79 | 73 | 88 | 98 |
| Protein | 60 | 65 | 76 | 80 |
| Vitamin A | 157 | 124 | 211 | 233 |
| Ascorbic acid | 338 | 298 | 442 | 510 |
| Thiamin | 61 | 55 | 60 | 87 |
| Riboflavin | 136 | 95 | 143 | 140 |
| Folate | 55 | 43 | 61 | 61 |
| Iron | 34 | 35 | 23 | 29 |
| Zinc | 57 | 87 | 79 | 103 |
| Calcium | 48 | 34 | 39 | 43 |
| Dietary characteristics | | | | |
| % energy from protein | 5.9 | 5.3 | 7.6 | 6.1 |
| % energy from fat | 5.2 | 4.3 | 5.8 | 7.2 |
| % energy from carbohydrate | 92.3 | 93.6 | 91.0 | 87.6 |
| % protein from animal sources | 33.8 | 43.7 | 35.2 | 46.5 |
| % iron from meat, fish, poultry | 6.6 | 21.0 ¹ | 10.3 | 20.0 |
| % zinc from animal sources | 14.2 | 24.0 ² | 18.7 | 24.0 |

¹ $p < 0.05$.
² $p = 0.066$.

There was wide variation in daily energy intakes for women, but median intakes were lower than recommended intakes in both the baseline and the final evaluation, as shown in Table 5.10 (which does not present results for pregnant women as there were very few of them). Energy recommendations were calculated on the basis of moderate activity for these women, who frequently spend several hours a day doing agricultural work in their fields. Most women were within the normal range for BMI, as seen in Table 5.11, indicating that overall energy intakes were near to their requirements. Median protein intakes were lower than recommended. Women’s median intakes of vitamins A and C and riboflavin were adequate, but – similar to children’s – their intakes of iron, zinc, calcium and thiamine were low, although median intakes of zinc were significantly higher after the project, probably owing to eating more fish.

Table 5.11 Percentages of non-pregnant women carers with adequate BMI

| BMI | Baseline % | Final % |
|-----------|------------|-----------|
| | n = 56 | n = 34 |
| < 18.5 | 1.8 (1) | 2.9 (1) |
| 18.5–24.9 | 94.6 (53) | 88.2 (30) |
| 25–29.9 | 3.6 (2) | 8.8 (3) |

Food sources of energy and nutrients

The major sources of energy in the diet were cassava and banana. Together these provided more than half the energy in the diet, although for young children the proportion was less after the project (51 percent baseline, 44 percent final), indicating that more (non-breastmilk) energy came from other food sources. For

young children, the proportion of energy from fruits (excluding banana) increased after the project; fruits are grown locally.

There was an increase in the proportion of protein from animals. Protein from wild animals increased from 8.4 percent of dietary protein at baseline to 14.1 percent after the project, for all women and children; the increase was even greater for young children (from 3.1 to 12 percent). These foods were consumed more frequently and in larger quantities after the project, including by young children. There was also an increase in the proportion of protein from fish, rising from 12.3 to 18.9 percent of dietary protein for all women and children, and from 13.8 to 22.7 percent for young children. Young children consumed more milk after the project.

Traditional and market sources of food energy

Most dietary energy for all groups was provided by traditional, locally produced or hunted foods, with only a small proportion coming from market or donated foods, as shown in Table 5.12. This proportion is higher for young children, mainly owing to the milk and food they receive from donation programmes, and to snack foods purchased from local shops.

Health situation – childbirth

The majority of children were born in the home, with the mother alone or with a family member present (80 percent baseline, 70 percent final); in both surveys, 17 percent were born at home with a health worker or midwife attending. In the final survey, 13 percent of children were born in a health facility, compared with 3 percent at baseline. The Ministry of Health is promoting institutional birthing to reduce maternal mortality, but accessibility to health facilities is very difficult in this remote area.

Child morbidity

There was high prevalence of illness among children in this population, especially younger ones, and particularly high incidences of diarrhoea, respiratory infections and parasites, which were recorded as higher in the final

survey than at baseline (Table 5.13). The project did not include testing or treatment for parasites; health promoters recommended herbal treatments and referred mothers to the health post. Mothers may have become more aware of ill health and parasites after the project, as they had had more contact with health promoters.

Women’s health

Sixty-seven percent of mothers reported that they were in good health all or most of the time at baseline, and 63 percent in the final survey. Eighteen percent of mothers reported having diarrhoea during the past

Table 5.12 Median percentages of dietary energy derived from traditional/local and market foods, by age group

| Age group | Traditional/local foods | | Market foods | |
|-----------------------|-------------------------|-------|--------------|-------|
| | Baseline | Final | Baseline | Final |
| 6–23 months | 84.3 | 86.3 | 15.7 | 13.7 |
| 2–5 years | 83.7 | 92.3 | 16.3 | 7.7 |
| Lactating mothers | 94.7 | 94.4 | 5.3 | 5.6 |
| Non-lactating mothers | 93.9 | 94.1 | 6.1 | 5.9 |

Table 5.13 Health status of infants and young children as reported by mothers

| Health status | Age group in years | % children | |
|-------------------------------|--------------------|------------|--------|
| | | Baseline | Final |
| | | n = 64 | n = 39 |
| Child is healthy | < 2 | 64.1 | 61.9 |
| | 2–4 | 83.9 | 73.9 |
| Child had diarrhoea yesterday | 0–4 | 6.3 | 17.9 |
| Child had fever yesterday | 0–4 | 9.4 | 10.3 |
| Child had cough yesterday | 0–4 | 25.0 | 17.9 |
| Parasites: present | < 2 | 26.4 | 47.6 |
| Parasites: no/unknown | < 2 | 73.6 | 52.3 |
| Parasites: present | 2–4 | 54.8 | 47.7 |
| Parasites: no/unknown | 2–4 | 45.1 | 52.2 |
| Diarrhoea in the last month | < 2 | 43.4 | 47.6 |
| Diarrhoea in the last month | 2–4 | 25.8 | 30.4 |



month at baseline, and 26 percent in the final survey. Similar to the children, the presence of parasites among women was high: 40 percent reported parasites at baseline and 50 percent in the final survey, with most of the others saying they did not know whether or not they had parasites. Other illnesses reported by mothers included malaria, dengue, tuberculosis and typhoid fever (with prevalences between 1.6 and 7.9 percent). In the final survey, two mothers reported diabetes and one hypertension. Forty percent of mothers reported that they had had a health problem during their pregnancies, and 31 percent reported mastitis.

Maternal mental health

Mothers were asked some simple questions regarding their mental health. About half of them did not answer these questions, perhaps because they did not understand what the translator was asking. Among those who did answer, 35 percent at baseline and 45 percent in the final survey said they felt animated during the day, whereas 44 percent at baseline and 50 percent in the final survey reported feeling tired, bored or sleepy. In both surveys about 90 percent of those who answered said they felt valued by their family; 70 percent at baseline and 91 percent in the final survey felt valued by their community, and 95 percent in both surveys said they considered that what they did was important.

Children's nutrition status

Table 5.14 indicates that there was no improvement in the nutrition status of young children during the project

period, as measured by anthropometry. Although there appears to have been an increase in stunting in the younger age group and a decrease in the older group, no clear conclusions can be drawn, owing to the small sample size.

Women's nutrition status as measured by BMI

The mean BMIs of non-pregnant mothers in the survey were 21.8 at baseline and 22.3 at the final evaluation. The distribution of BMI shown in Table 5.11 shows that the majority of mothers were within the normal range, with no change after the project. Nevertheless, there was a slight (statistically insignificant) increase in overweight women in the final survey in this small sample.

Women's activities

Information about women's daily activities was derived from interviews with mothers and an interactive exercise of assigning balls to containers (see the previous section on Methodology). Typical daily activities involved rising very early, cooking (boiling) cassava and other food, eating and going to the fields (on only two or three days a week during the rainy season) to collect food for about six hours. On the days they did not go to the field, the mothers did housework, and in the afternoons they washed clothes (they estimated spending a total of 7.5 hours on housework and caring for family members) and engaged in recreational activities or sports (e.g., volleyball) for an estimated two hours. In the evenings they prepared the evening meal and went to bed early as they lacked light or electricity. Forty-two percent of

Table 5.14 Proportions of children with $\leq -2SD$ for height-for-age, weight-for-age and weight-for-height Z scores

| Nutrition status | % children | | | | | |
|---------------------------------|---------------|---------------|---------------|---------------|------|----|
| | 0-23 months | | 2-4 years | | | |
| | Baseline | Final | Baseline | Final | | |
| | <i>n</i> = 53 | <i>n</i> = 20 | <i>n</i> = 29 | <i>n</i> = 21 | | |
| $\leq -2SD$ height-for-age Z | 43.4 | 55.0 | ns | 62.0 | 52.0 | ns |
| $\leq -2SD$ weight-for-age Z | 20.8 | 20.0 | ns | 24.0 | 24.0 | ns |
| $\leq -2SD$ weight-for-height Z | 0 | 5.0 | ns | 0 | 10.0 | ns |

the mothers interviewed did some paid work out of the house, mostly in other people's fields or caring for other people's children.

Discussion

The Awajún have always lived in close equilibrium with their natural surroundings. Their forests and rivers are their life-blood and livelihood: "...if the rainforest disappears, the Awajún disappear" (Chang and Sarasara, 1987). The food system was based on more than 200 traditional foods, but the nutritional and health situation of the Awajún is not optimum (Creed-Kanashiro *et al.*, 2009; Roche *et al.*, 2007). Increased nutritional knowledge – especially regarding the needs of infants and young children – greater access to disappearing high-quality foods, the integration of appropriate market products and improved health strategies are needed. This case study project, aimed at enhancing the nutrition and health of Awajún women and young children along the Cenepa River through the promotion of nutritionally appropriate traditional foods, led to increased knowledge about these foods. The project increased the production, accessibility and use of these foods for better nutrition, thus contributing to maintaining their essential role in the food system and in the population's diet, culture, ecosystem and environment.

Nutrition and health promotion requires access to appropriate foods and educational processes that lead to behaviour change. The project activities were based on the results of an earlier participatory study documenting the food system, and responded to community leaders' requests to address the nutritional situation. The project strategy focused on training elected community health and nutrition promoters following the ODECOFROC structure, and using innovative adult education methodologies. The community promoters then implemented food production and education activities in their communities, supported by intermittent visits from the leaders of ODECOFROC's Women's Programme. The promoters were enthusiastic and very interested participants, but had some difficulties in transmitting the information in their communities owing to their

education level, logistics and gender issues, and the population's misperception that foods from "outside" are better than local ones. These issues were addressed in workshops, emphasizing practical aspects and key messages, but this resulted in the project being delivered differently in each community and delayed the communities' exposure to activities.

In spite of these difficulties, mothers remembered the food and nutrition messages; knowledge of the importance and benefits of traditional foods increased; the production of foods was greatly enhanced, through the local cultivation and recuperation of seeds and plants and the introduction of family fish farms; and more meat was obtained from hunted animals. The promoters found it easier to promote food production than impart nutrition information. The benefits of some of these activities, such as the cultivation of fruit, palm and other trees, will increase in the future, because of the time required for trees to grow and produce fruit, so the effects immediately after the two-year project were somewhat limited.

The total number of foods consumed by all the families evaluated, as measured by 24-hour dietary recall, was very similar in both the baseline and final surveys, in spite of the smaller sample size in the final survey. This was true of both traditional foods (76 baseline, 72 final) and market/government-donated foods (25 in both). At the individual level, the TFDS at baseline was similar to that described by Roche *et al.* (2008), but had increased significantly after the project, for both women and young children. These results indicate that food diversity and the traditional food system were maintained and enhanced despite the increased presence of market foods in the area, which has been shown to have a negative effect on the nutrition of other populations (Kuhnlein *et al.*, 2004; Kuhnlein and Receveur, 1996; Port Lourenço *et al.*, 2008; FAO, 2009).

The biodiversity available to populations with limited economic resources enhances their food security (Claverías and Quispe, 2001). The Awajún mothers interviewed generally expressed confidence in their current food supply, although it was not always of the quantity or quality that they would have liked, especially



regarding animal products and fruits – use of both these foods increased after the project. However, the mothers expressed concerns about not having access to new fields to cultivate and about difficulties in reaching animals for hunting in the future.

Exclusive breastfeeding during the first six months of life and continued breastfeeding with complementary foods until two years of age provide optimum nutrition and protect against illness (PAHO/WHO, 2003). The final survey sample size was too small to evaluate the project's impact on exclusive breastfeeding, but the introduction of complementary drinks and foods was delayed until about six months of age, reflecting the adoption of improved practices. Good breastfeeding practices, especially during the second year, still need to be reinforced. There were high incidences of illness among infants and young children, and improved breastfeeding and complementary feeding practices are needed to help protect against illness. Foods were sometimes reported to be pre-masticated by the care giver, to facilitate acceptance and digestion by the child, and this may have a protective effect against illness (Pelto, Zhang and Habicht, 2010). This practice is decreasing, however, owing to health personnel's current recommendations to avoid pre-mastication.

With the exception of iron, zinc and calcium, children's median energy and nutrient intakes were estimated at close to recommended levels in both the baseline and final evaluations. For every nutrient, the proportion of children under 24 months not meeting 80 percent of the recommended intake decreased, indicating an improvement in dietary intakes. Some indicators of dietary quality improved significantly in children aged six to 23 months, including the proportions of energy from protein and of iron and zinc from high-bioavailable animal sources. Meat and fish intakes were higher after the project, a direct result of having more meat from hunted animals and fish from fish farming. These were foods distributed within the family to favour younger children. Fat intake also increased, which is important considering the low fat content of the children's diets.

The dietary intakes of energy and, especially, iron, zinc and calcium of adult women with moderate activity

tended to be lower than recommended in both the baseline and final evaluations. As with the children, there were significant increases in the proportions of energy from protein and of iron and zinc from high-bioavailable animal sources among the women, indicating a similar increase in meat and fish intake after the project.

The case study recorded improved feeding practices and dietary intakes for children, but no impact on their nutrition status; rates of stunting were high, as in other studies of this and similar indigenous populations (Huamán-Espino and Valladares, 2006; Roche *et al.*, 2011; Soares Leite *et al.*, 2006), and remained high after the project. Besides diet, other factors also affect growth (WHO, 1998), particularly illness. The rates of illness (especially parasitic infections) reported in this study were extremely high, and are likely to have contributed to the lack of improvement in nutrition status. Mothers also had high rates of parasitic infections, which have also been reported in similar indigenous communities of the Peruvian and Brazilian rain forest (Ibáñez *et al.*, 2004; Carvalho-Costa *et al.*, 2007).

There were several limitations to this study:

- Health and nutrition promoters had variable success in transmitting activities and messages to the project communities.
- The limited access to communities in this remote area of difficult terrain made follow-up and monitoring activities very difficult and expensive.
- Although the project included home, food and personal hygiene information, it did not cover the evaluation or treatment of parasites and illnesses. Future interventions should include more on health problems, including water quality.
- Anaemia was not evaluated (owing to the population's concern about giving blood samples) or treated, although it is known to be a public health problem (INEI, 2001).
- The evaluation did not include a control group, which limits the validity of the results. (This is a frequent issue for interventions.)
- The small sample size in the final evaluation and the inclusion of some of the same families as in the baseline also limited the value of the results.

Despite these limitations, however, the project contributed to local awareness and knowledge about the value of traditional foods. The enhanced production of seeds and animal-source foods had a modest positive effect on feeding patterns, the distribution of food within families and dietary quality, particularly for young children. The Awajún people were aware of the changes that were occurring, and responded positively to the need to defend their culture and improve their food. They appeared eager to learn more about nutrition and better feeding for their families and young children. Further similar initiatives are needed to benefit the nutrition and health of the Awajún.

Lessons learned

Coordination with local community organizations was effective, and ODECOFROC considered the project leaders' interactions with ODECOFROC staff and the communities as setting a good example to follow, especially the research agreements and delivery of reference material on local foods prior to project commencement. However, the project and local health facilities would have benefited from greater coordination with government institutions such as the local Ministry of Health and food donation programmes. This could have increased the consistency of key messages and activities relating to traditional foods and nutrition in the area, and would also have facilitated the incorporation of health promotion into an integrated approach that included the treatment and prevention of illnesses in addition to the project's hygiene, nutrition and local food production components.

The project's community nutrition and health promoters were committed and involved in the project, and rapidly grasped information about local and traditional foods through the practical sessions on food selection and preparation. Working with promoters was an appropriate strategy for reaching communities along the riverbanks and in the hills, as designated by ODECOFROC and the Women's Programme. However, several promoters had difficulties in transmitting their

knowledge and skills to their communities, although the project's increasing focus on practical aspects and key messages helped. Efforts are needed to remediate these aspects in future interventions of this nature. The IIN technical team was present for education activities only twice a year during the two-year project, which reduced the support it was able to give to the promoters. In future, more frequent technical support and accompaniment would benefit the promoters and their activities in the communities. Finding ways of compensating promoters for the time they dedicate to their community work may also allow them to spend more time on project activities.

The ODECOFROC Women's Programme was key to this project, especially its work to improve the quality of life in the communities, largely through promoting fish farms, reforestation and the raising of small animals; all of these were successful programmes that increased access to and use of local, traditional and nutritious foods. Without this, effective coordination with other institutions working in these areas could not have occurred. The Women's Programme was also key in coordinating and supporting the promoters, assuring continuity, assisting project implementation in the communities, and monitoring activities ✖

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