Chapter 12

Let's Go Local! Pohnpei promotes local food production and nutrition for health

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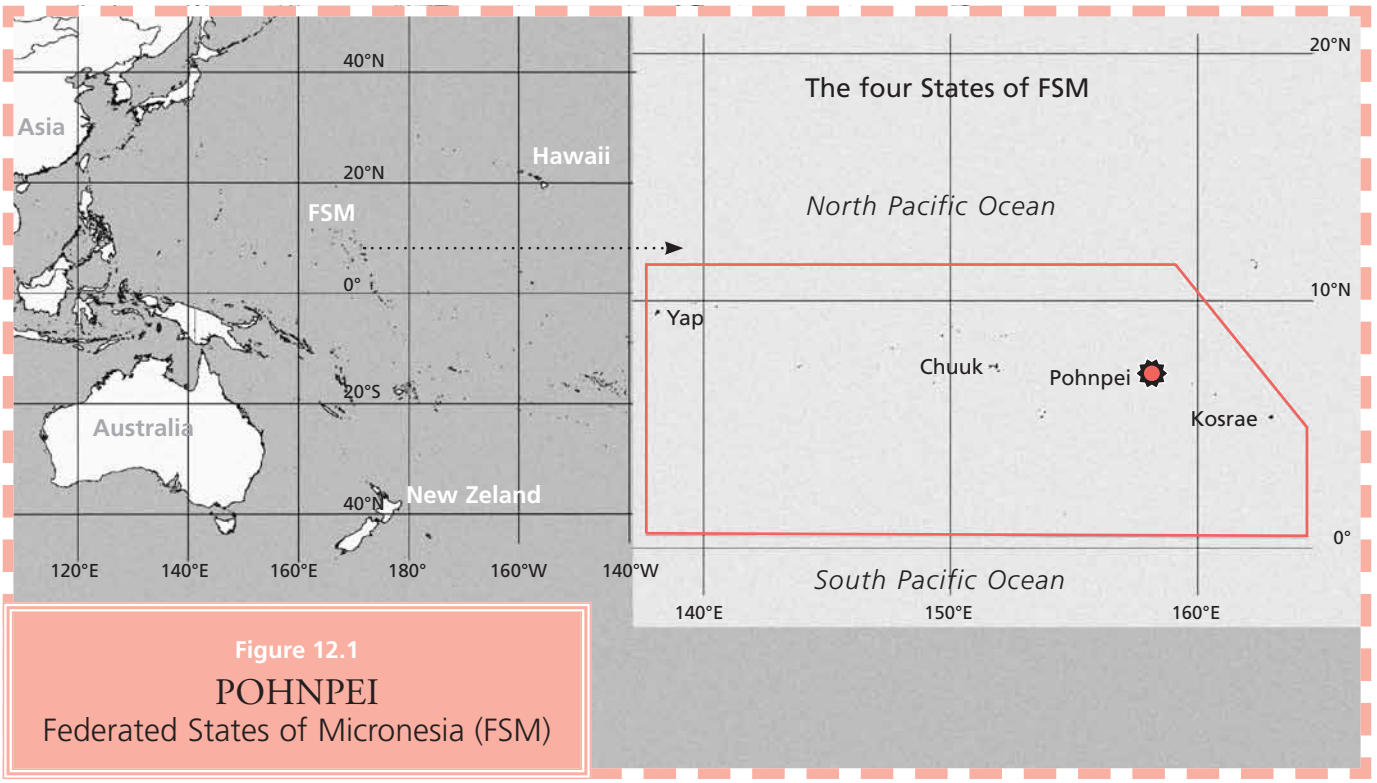

Figure 12.1
POHNPEI
Federated States of Micronesia (FSM)

Data from ESRI Global GIS, 2006.
Walter Hitschfield
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Photographic section >> XXV

"Let's Go Local! Grow and eat local foods for their 'CHEEF' benefits: culture, health, environment, economics and food security."

Island Food Community of Pohnpei

Abstract

The Pohnpei community intervention programme took place in Mand community, Pohnpei, Federated States of Micronesia (FSM) from September 2005 to June 2007. The programme aimed at increasing the production and consumption of locally grown foods and improving health. A community-based, participatory, inter-agency, multiple-methodology approach was used, with all age groups in the community participating in programme activities. The programme had two phases: phase 1 involved documenting the traditional food system and imported foods, and assessing health status, using the Centre for Indigenous Peoples' Nutrition and Environment methodology; phase 2 involved two sub-phases. In phase 2a, promotion and intervention activities focused on building awareness through workshops, competitions (weight loss, planting and cooking), mass media, posters, billboards, postage stamps, postcards and other materials; the conservation of rare crop varieties; and small-scale food processing. In phase 2b, the impact of promotion and intervention activities carried out in phase 2a was evaluated. Activities for expanding the programme continue.

Phase 1 revealed neglect of the traditional food system, reliance on rice and other imported processed foods, and high incidence and prevalence of overweight, obesity and diabetes among adults, and of stunting, vitamin A deficiency and dental decay among children. Detailed studies initiated in 1998 revealed that local staples, including yellow- and orange-fleshed banana, giant swamp taro, breadfruit and pandanus varieties, are rich in nutrients. They contain substantial levels of provitamin A and other carotenoids, which are important in alleviating vitamin A deficiency and other chronic diseases such as diabetes, heart disease and cancer. Promotional activities based on the campaign slogans – "Let's Go Local" and "Going Yellow" – were adopted widely throughout FSM to promote local foods and yellow- and orange-fleshed staple crop varieties.

The project impact evaluation revealed a significant decrease in rice consumption; an increase in the consumption frequency of local banana varieties, giant swamp taro and vegetables (including green leaves); an increase in the intake of local food diversity and provitamin A carotenoid; and a positive change in attitude towards local food. The Pohnpei Go Local campaign also created interest nationally and regionally.

Background: context of the research site

The Federated States of Micronesia (FSM) is an independent island country located in the western Pacific Ocean. It comprises 607 islands and has a population of 107 434 people (July 2009 estimate) (FSM Department of Economic Affairs, 2002; CIA, 2010). The country is divided into four states: Pohnpei, Chuuk, Yap and Kosrae.

Pohnpei, a mountainous island about 40 km in diameter and 355 km^2 in area, is the location of the FSM national government. It is situated 6° 55 north latitude and 158° 15 east longitude (Figure 12.1) (CIA, 2010). Pohnpei State (population about 34 500) includes the main island of Pohnpei divided into five municipalities – Nett, U, Madolenihmw, Sokehs and Kitti – and five main outlying low atoll islands with distinct languages and cultures: Sapwuafik, Nukuoro, Kapingamarangi, Mwoakilloa and Pingelap.

Pohnpei Island has rich agricultural resources, while the atolls have hot dry climates and poor sandy soils that make it difficult to grow crops.

Demographic and cultural characteristics of the study site

The intervention study site is Mand community, Madolenihmw Municipality in Pohnpei State. It is a rural community, about a 40-minute drive on a paved road from the town centre of Kolonia. The average annual temperature is about 27 °C, with heavy rainfall and verdant tropical vegetation. Agricultural resources are abundant all year round.

Context of the food system

FSM's economy is based on subsistence farming and fishing. Sources of cash income include formal employment, agriculture, remittances or pensions, and fishing (Drew, 2008). More than 25 percent of the population is considered to be living below the poverty line (Abbott, 2004; CIA, 2010). Because of the availability and convenience of imported processed foods, traditional methods of local food preservation have been greatly neglected, and there has been little uptake of modern methods for the small-scale processing of local foods (Englberger, 2003; Englberger, Marks and Fitzgerald, 2003b).

The main crops of the Pohnpei traditional food system include many varieties of banana, breadfruit, taro and yam, which are consumed with coconut, fish and seafood; foods eaten as snacks include fruits and sugar cane (Merlin *et al.*, 1992; Raynor, 1991). Vegetables (other than the traditional starchy staple foods) have only recently been introduced. Pohnpei society apparently had good nutrition status up to the 1950s, when people consumed mainly traditional staple food crops and had traditional lifestyles with ample physical activity (Murai, Pen and Miller, 1958).

The neglect of Pohnpei's traditional food system and the shift towards processed, less healthy imported foods accelerated in the 1970s. The causal factors for this change include the availability of convenience food; the high status and low cost of imported white rice, flour, sugar, fatty meats and other refined processed foods; changing lifestyles and family structures; the shift from subsistence farming to a market economy and cash employment; inconsistent external and internal government policies and food aid programmes; the large sums of money made available through the Compact of Free Association with the United States of America; and modernization and globalization.

The shift to imported foods in Pohnpei and other parts of Micronesia has been more drastic than in many other parts of the Pacific (Schoeffel, 1992). From 1885 until the end of the Second World War in 1945, Pohnpei was colonized by three colonial powers: Spain, Germany and Japan. In 1945, it and the other islands in what is now FSM became part of the United Nations (UN) Trust Territories of the Pacific Islands under United States of America administration. In 1961, the UN criticized the United States of America for neglecting the islands, and development activities greatly increased soon after.

One set of controversial programmes that greatly influenced FSM food habits were the United States Department of Agriculture (USDA) supplementary feeding programmes. These started in the 1960s, increased in the 1970s and continued into the 1990s. USDA surplus commodities (including rice and tinned foods) provided food for school lunches, needy families, the elderly, and disaster relief in Pohnpei (Schoeffel, 1992; Englberger, Marks and Fitzgerald, 2003b). The 30-year United States School Lunch Program and other food aid programmes introduced rice and processed foods to many children and adults in Pohnpei, establishing new food habits, attitudes and food tastes that persist today.

In 1986, FSM became independent but kept close ties to the United States of America through the Compact of Free Association (CIA, 2010). Large sums of money were provided to FSM communities, giving opportunities for jobs and cash for purchasing store foods that are mainly low in nutrients. The first Compact ended in 2001, but a second Compact renegotiated in 2003 provides large amounts of development funding annually up to 2023.

Overall health and nutrition status

A large health study conducted in Pohnpei in the late 1940s identified no diabetes (Richard, 1957; Hezel, 2004). However, by the late 1980s, the prevalence rates

of overweight, obesity and diabetes, along with those of other non-communicable diseases such as heart disease and cancer, were rapidly increasing, and these conditions were becoming problems of epidemic proportion (Coyne, 2000; Elymore *et al.*, 1989; Englberger, Marks and Fitzgerald, 2003b). For example, the STEPS survey[1] of Pohnpei showed that more than 70 percent of the adult population aged 25 to 64 years (both sexes) was either overweight or obese (more than 80 percent of women were classified as overweight) and 32.8 percent of adult participants (both sexes) were diabetic (WHO, 2008).

A global report indicated that FSM had the second highest national prevalence of obesity in the world, ranking below only Nauru, another Micronesian island country (Streib, 2007). Of the ten countries in the world listed as having the highest obesity rates, eight were Pacific Island countries. Although the data considered in this 2007 report vary by sampling procedures, age groupings and year(s) of data collection, making it difficult to interpret country rankings, the situation in Pohnpei and other parts of the Pacific has undeniably become serious. Many families are suffering, and the problem has escalated, as reflected in the STEPS survey (2008). One projection indicates that if behaviour changes in diet and activity are not introduced, by the next quarter century more than half of Pohnpei adults will be diabetic (CDC, 2000).

Pohnpei also has a serious micronutrient deficiency problem. In 1993, more than half of its children under five years of age had vitamin A deficiency (Yamamura *et al.*, 2004). To alleviate this deficiency, a vitamin A supplementation programme was established for all children aged one to 12 years. However, there have been logistical and organizational difficulties with distributing the supplements.

Rationale and objectives

Similar to the situation in other indigenous communities globally, FSM's indigenous foods that are rich in carotenoids and other phytochemicals have been neglected owing to the transformation of food habits. The change in food habits from fresh traditional foods to processed imported foods has been accompanied by high prevalence of overweight, obesity, diabetes, heart disease and cancer among the adult population, while micronutrient deficiencies, such as of vitamin A, are prevalent among children. Responding to growing concern about the emergence of nutrition and health-related epidemics related to change in diets, this project sought to revive the use of neglected traditional foods among the traditional community of Mand in Pohnpei.

The objectives were to:

- improve awareness of the high nutritional values of local foods;
- increase the production and consumption of local Pohnpei foods and varieties, especially those rich in carotenoids and other nutrients;
- evaluate the project using health status measures and awareness indicators, locally, nationally and internationally.

Methodology

A research agreement was established in March 2005, jointly signed by the Mand community leader, the Island Food Community of Pohnpei (IFCP) and CINE (Englberger *et al.*, 2005; 2009b; 2010b).

The Pohnpei case study consisted of two phases, which took place over a period of five years (May 2005 to March 2010):

- phase 1: documentation of baseline data on the contemporary food system (May to August 2005);
- phase 2: intervention activities and evaluation: phase 2a (August 2005 to August 2007) involved intervention and administrative activities, many of which were island-wide, and collection of qualitative data and process indicators (August 2005 to May 2007); and phase 2b was an evaluation of the programme (June to August 2007).

In June 2009 a further assessment of the diet was conducted, following a two-year absence of intervention activities in the target village of Mand.

[1] STEPS is a World Health Organization (WHO) research process tool for non-communicable disease risk factor surveillance: www.who.int/chp/steps/manual/en/index.html

Study site

Mand community was chosen because it fulfilled the overall study criteria. These included being a rural indigenous community comprising about 500 people, being accessible for transport, and being willing to participate. A group of settlers from the Pohnpei atoll of Pingelap occupied the village in 1954, and Pingelapese people are still its original inhabitants. An additional selection criterion was the availability of staff from collaborating agencies that had strong linkages with Mand community and could assist the project.

Participatory research

The study adopted a community-based, participatory, inter-agency, multiple-methodology approach, including social marketing. Ethnography (Fitzgerald, 1997)[2] was used for continual assessment of the situation in the community and for considering the intervention approaches that might be most effective. With coordination by IFCP, activities were facilitated by government and non-governmental agencies, including the Pohnpei State Departments of Health, Education, and Land and Natural Resources; the Offices of Economic Affairs, and Social Affairs; the College of Micronesia (COM)-FSM Cooperative Extension Services (CES); USDA's Natural Resources Conservation Service; the Conservation Society of Pohnpei; and Peace Corps Micronesia. Other partners included V6AF Radio, Island Cable Television, Kaselehlie Press, FSM Telecom, Micronesia Seminar and local businesses.[3]

Mand community members in all age groups were well informed about the projects and were encouraged to participate. Some project facilitators were selected because of their close relationship to the community and their commitment to the project. All meetings and intervention activities were announced on the community hall notice board and at church and other community events. Community leaders and members were trained and fully informed about the project prior to their full engagement in the planning and implementation of appropriate activities. Individual consent for participation in both phases of the study was obtained. This included getting permission for the use of photographs in newspaper articles and film interviews.

As staff from many agencies assisted in this project, an inter-agency approach was also used to prepare this chapter. Many individuals assisted voluntarily, because they were passionate about the project and its importance. Activities were carried out throughout the island of Pohnpei, but the intervention's effects were documented in the community of Mand.

Phase 1: documentation phase

This phase involved documenting the traditional food system through focus group discussions, in-depth interviews of key informants, literature review, photography and observation. These took place during community meetings, home visits and visits to organized meetings in both Mand community and Kolonia, where some community members work and live.

Key informants

These were selected on the basis of their expertise on specific topics, for example individuals (mostly elderly men) with long experience of identifying fish were selected as key informants on fish.

Analysis of neglected local foods

This involved a series of studies, which were published in several papers (Englberger *et al.*, 2003a; 2003b; 2003c; 2006a; 2008; 2009a; Thakorlal, 2009). Sampling and analysis methodologies are described in detail in specific papers.

Cross-section baseline survey

This included the gathering of baseline data from a random sample of households in Mand, using dietary assessment via seven-day food frequency questionnaires

[2] Ethnography includes such methods as informal focus group discussions, in-depth interviews of key informants, literature review, photography and observation.

[3] V6AF radio broadcast many project items; Island Cable Television provided multiple airings of IFCP-supported videos; and Kaselehlie Press published project items in its biweekly newspaper issues. FSM Telecom issued a telephone card promoting the state banana of *Karat*, and published a two-page insert on IFCP's work in its annual telephone directories from 2008 to 2010, including a photograph of this case study. Micronesian Seminar assisted in producing promotional films, and local businesses displayed and distributed IFCP promotional materials in their shops.

(FFQs) and two 24-hour recalls on non-consecutive days; health status assessment by anthropometry, fasting blood glucose (FBG) and blood pressure measurements; and agroforestry and socio-economic questionnaires.

Phase 2: promotion and intervention phase

Activities were promoted and implemented at three major levels: community, state/national, and regional/international. Qualitative assessments, including observation, key informant interviews, focus group discussions, field notes, process indicators, photographs and a Mand log of activities, were used to supplement other data collection methods in both phases and in planning.

Throughout this phase, the focus was on facilitating effective behaviour change, such as by identifying the factors to be considered when designing food-based interventions for Micronesia (Englberger, Marks and Fitzgerald, 2003a); the predisposing, enabling and reinforcing factors of specific issues and problems (Green and Kreuter, 1991); and factors relevant to dietary change and the promotion of traditional food systems (Kuhnlein and Pelto, 1997; Barker, 1996; Pollock, 1992; Shintani *et al.*, 1991).

Activities at the community level

General community meetings. The main purposes of these were to document the contemporary food system and discuss and plan activities appropriate for the intervention phase. Two larger meetings were organized: one in Mand, to allow community participation; and the other in Kolonia, to bring together relevant government and non-governmental agencies and Mand community. Children were encouraged to attend meetings, where they usually viewed films and tasted local food dishes. At these meetings, two major themes were agreed as the focus for all community activities:

- awareness of local foods' value and importance for health;
- training on how to grow and utilize local foods better, including new recipes and appropriate technology, and involving adults and youth of different ages.

Campaign slogans. The three slogans communicated project concepts in a simple, powerful way, which helped people remember and talk about the project, thereby assisting the process towards behaviour change:

- The project revived the "Let's Go Local" slogan, which was coined in the 1980s by a local leader who encouraged retaining traditional values and customs, including growing and consuming local food. This slogan was used on billboards (see Photographic section, pp. XXV to XXVIII), in songs and videos, on t-shirts, as a title for newspaper articles and a topic for radio programmes, and in face-to-face interactions.
- "Going Yellow" conveyed the "Yellow Varieties Message", emphasizing that yellow-fleshed varieties of fruits and vegetables are rich sources of nutrients that have health benefits. This slogan restored interest in local food varieties that were commonly consumed in the past, but have been neglected in recent years. It was used in local Pohnpei food posters, songs and videos, on t-shirts and in face-to-face discussions.
- "Practise What You Preach" refers to putting into practice the "Let's Go Local" slogan. It encouraged people to prepare and serve local foods and drinks at community functions and meetings.

Mand Community Working Group meetings. General community meetings were followed up by meetings of the Mand Community Working Group, whose members are local leaders interested in participating in the project. The main purposes of these meetings were to plan, decide and implement appropriate approaches and activities for promoting local foods, raising awareness and conducting intervention activities in the Mand community. A total of 500 community members took part in 78 meetings between September 2005 and June 2007, with about 20 to 30 adults attending each. Meetings were usually held in the community hall in the evenings, when people were

more likely to be able to attend. Activities included the following:

- *Group interviews:* People were interviewed on the foods they had eaten that day (starchy staples, rice, fruits, vegetables) and there were occasional quizzes on topics related to the theme of the week.
- *Meeting bags* (for new members): The bags contained information materials for the project, including illustrated newspaper articles, colour photographs of members, local food promotion leaflets and a list of project activities. These were given to new members of the Mand Community Working Group, to welcome them and familiarize them with the project.
- *Planning of upcoming activities:* Promotion and intervention activities were planned and endorsed; individual members were consulted and their consensus was sought.
- *Awareness activities:* These included talks, films, weight and waist measurements, field trips and photography.

Invited guests gave brief talks on healthy lifestyles, understanding diabetes, the Yellow Varieties Message, container gardening, weight loss and management, dental care, and breastfeeding. The talks included the use and introduction of teaching materials, such as the Pohnpei local food posters, the Pohnpei bananas booklet, and the Pacific indigenous foods poster.[4] The talks aimed to improve community members' understanding of the relationships among diet, lifestyles and health.

Films shown included *Going Yellow*, to reinforce project messages and provide enjoyment. Local foods and community members were regularly filmed and photographed. Film documentaries were prepared for promoting local food, and one was put online.[5] Others were shown on local television or distributed as videos and DVDs for use at family gatherings. Photographs of Mand community members and their families were used as gifts and souvenirs of project activities, which also reinforced local food promotion messages and generated positive feelings about the project. Photographs were taken for newspaper articles, other publications and presentations at local, national or international meetings; for a recipe collection (Levendusky, 2006); and for local promotion materials, such as three FSM national postage stamps.

Guidelines were given on the use of healthy local refreshments at meetings and in the home. Families were told that all the refreshments they brought to meetings had to use local foods and be prepared hygienically using healthy ingredients (low in salt, fat and sugar). Serving plates and baskets had to be of local biodegradable materials (leaves or woven baskets). Families were told that this saved a lot of money and was also good for the environment. Families providing refreshments for meetings received small payments, as an income-generating activity (this was rotated to give all families an opportunity).

Planting materials, including banana, soursop and citrus seedlings, were distributed to farmers and other interested people. Some varieties of banana (e.g., *Karat* and *Utin Iap*) and coconut (e.g., *Adohl*, which has a sweet husk that can be consumed) are quite rare, and few families had lemon grass, which grows easily and can be made into a tasty hot or cold drink. Provision of these planting materials was important in helping families to start growing these crops.

Demonstrations of ways of minimizing fat, salt and sugar consumption focused on baking, boiling or grilling (versus frying) and the use of natural sweeteners, such as ripe banana, coconut juice or fresh sugar cane. Families were told that excessive sugar and fat contribute to overweight and obesity and lead to specific illnesses, and that sugar contributes to dental decay and salt to high blood pressure, serious health problems and death. Families were encouraged to eat more unprocessed, fresh foods that are low in fat, salt and sugar, and are important for healthy and happy living.

Although recipes were not prepared at the meetings, ways of preparing dishes, with ripe local fruit and nuts for desserts and snacks, were described, so families learned new recipes.

Efforts were made to convey simple health messages, including the following:

- People's health is affected by what they eat.

[4] www.islandfood.org
[5] www.indigenousnutrition.org

- Local food items are rich in essential nutrients, while many processed foods lack nutrients or contain low amounts, and may contain too much fat, salt or sugar.
- Yellow- and orange-fleshed banana, giant swamp taro, breadfruit and pandanus are rich in ß-carotene and other carotenoids, providing health benefits[6] (the Yellow Varieties Message).
- People should avoid eating large amounts and should generally eat less than they desire.
- People need sufficient physical activity to stay healthy.

Cooking, serving and documenting traditional dishes. During a 14-day Expanded Food and Nutrition Education Program course conducted by COM-FSM's CES, community members were trained about the nutritional and health importance of local foods and how to cook foods that are easily available but neglected or underutilized, such as green leafy vegetables, banana blossom and green papaya, as well as introduced vegetables[7] that families can grow easily.

Planting and weight loss competitions. Mand Community Working Group members were selected and trained to monitor planting and plant management activities, and to visit competitors' plantations. The purpose of this activity was to stimulate community members' interest in and commitment to growing and consuming healthy local foods. As part of the weight loss competition, weight, height and waist measurements were recorded. Counselling services were provided to people who required them, especially those found to be overweight, obese and/or suffering from nutrition-related disease. Participants also learned about healthy weights.

Container gardening (vegetables) training and nursery project. This joint project with USDA's Natural Resources Conservation Service (NRCS) was based on 14 demonstration plots and two nurseries, and included seedlings of a rare coconut variety. Demonstrations included the use of composted animal waste as an on-site source for soil improvement, application of mulch for erosion control and moisture retention, and minimal or zero tillage for subsistence agroforestry. The garden produce was served at working group meetings. This activity was linked to the planting and weight loss competitions and was very important in helping participants to grow their own vegetables.

Counselling through home visits. Families were visited in their homes and counselled on the results of their vitamin A and FBG tests. The visits were documented to provide insight for further activities.

Charcoal oven development. Through a week-long workshop, 34 energy-efficient, smokeless charcoal ovens were built and distributed. These were fuelled with charcoal made from coconut shells and readily available fuelwood. The ovens provided an economical, environmentally friendly alternative to kerosene, and a healthier more convenient way of cooking (baking) than traditional earth ovens. Following the workshop, a cooking competition using the charcoal ovens was held. A local carpenter was contacted to build the ovens commercially. He helped improved the design and built an oven for his own use, which he promoted through workshop demonstrations at his own expense. Since January 2009, improved charcoal ovens have been available for purchase from this business.

Youth involvement. The Mand Drama Club involved teenagers and younger children to make them more aware of the values of local food and encourage them to share these messages with others. A COM-FSM drama expert led the children's discussions on local foods and their values, and guided their writing of short pieces to act. Several performances were given, notably one for Easter 2006, which was filmed and raised much interest, demonstrating the value of this activity.

Youth were also involved in activities held with class 4 at Mand elementary school as part of the Youth to Youth project, in collaboration with the Conservation Society

[6] In-depth talks explained that provitamin A carotenoids protect against vitamin A deficiency disorders and anaemia. Carotenoid-rich foods protect against cancer, heart disease and diabetes.
[7] Vegetables included eggplant, bell pepper and Chinese cabbage.

of Pohnpei. Children learned about the importance of rare Pohnpei banana varieties, such as Karat, and how to plant and conserve them and use them in recipes. At the end of the school year, the children performed in the state-wide school fair, where students of other schools performed on other conservation topics.

Pilot farm genebank. This nursery and collection of banana, giant swamp taro and pandanus varieties was established near Mand in 2003 and improved by the project, to provide planting materials for its activities. The genebank was looked after by the Mand youth group, which used it to generate income and educational materials. Working group members made a field trip to the genebank, to obtain and learn about banana and other planting materials.

Mand Breastfeeding Club. About 20 young mothers gathered to talk about breastfeeding, photograph and weigh their babies and themselves, and take part in recreational talks, quizzes and yoga exercises. The focus was on the advantages of breastfeeding and how to produce more milk by stimulating the breast. A strongly held Pohnpei belief is that mothers should wake up to eat during the night, to produce enough milk, and this has often resulted in overeating and overweight. Mothers described "stuffing themselves" even when they were not hungry, as they wanted to help their babies. They expressed relief when they learned that they could stop this practice. A finale was a club picnic held at a small beach park and featuring a talk by the Pohnpei State Breastfeeding Coordinator.

Go Local billboards were installed to share the project message with as many people as possible. The attractive design showed a family planting and preparing foods, and several striking drawings of local foods, including *Karat*. One billboard was placed in Mand and two in Kolonia town, one at the hospital and one near the airport, both strategic and well-frequented sites.

Activities at the state/national level

These aimed to bring the project messages to a broader public. This not only fostered interest among groups outside the community, but also encouraged the community itself to work hard, as the state and the nation were watching to see the outcome. These activities were therefore of great importance.

Meetings, workshops and gatherings. Table 12.1 presents a summary of selected IFCP activities at state/national events, contributing to the overall Go Local campaign:

- *Annual Farmers' Fair/World Food Day:* This usually takes place in October with about 500 participants. Its main events are food crop competitions, school essay/art competitions, a healthy cooking competition and health screenings. The purpose is to promote crops, including rare yellow-fleshed varieties; healthy cooking of local foods; and art and writing skills and awareness of local food among youth. To help relay the Yellow Varieties Message, banana varieties are categorized, with larger prizes awarded for yellow-fleshed, carotenoid-rich varieties. The healthy cooking competition also has different categories for recipes using Karat and other yellow-fleshed varieties, and criteria include low use of fat, salt and sugar; taste; appearance; and cleanliness.
- *Local food pot luck dinner held by the Ambassador of the United States of America*: The Ambassador supported the Go Local movement and hosted a local food pot luck dinner in 2006 at her residence. Mand community members participated and sang a local food song, and the Let's Go Local High School Club performed a skit using the Pohnpei food posters.
- *Field trips to the outer atoll of Pingelap:* The purposes of these were to document traditional food crops from Pingelap, as Mand community was established by a group of Pingelapese people, and to share the Let's Go Local messages about the benefits of local foods. Two visits were made, focusing on documenting varieties of giant swamp taro and collecting planting material for the genebank.

Table 12.1 Selected Go Local activities and IFCP involvement in state/national events, 2006 to 2008

Event	*Date(s)*	*IFCP involvement*	*No. participants*
Mortlocks taro workshop, Mortlocks, Chuuk	15–18 Mar. 2006	Documenting taro varieties and collecting samples/plantlets	35
Pingelap workshop, Pohnpei	5–8 Jan. 2007	Daily workshops, training on local foods	75
FSM President's Inauguration, Pohnpei	16 July 2007	Display of materials and foods	350
Let's Go Local Club, Ohmine and Kolonia schools, class 6, Pohnpei	21 Sept. 2007	High school students teaching elementary students – Go Local	100
YINEC workshop, Colonia, Yap	26–28 Sept. 2007	Local food/nutrition training	20
FSM consultation on plant genetic resources, Pohnpei	4–6 Feb. 2008	25-minute presentation with Pohnpei students and "Banana Varieties" song	55
IFCP Training Center opening, Kolonia, Pohnpei	21 May 2008	Centre opened by Pohnpei Governor Ehsa	44
COM-FSM Annual Health Fair, Palikir, Pohnpei	30 Apr. 2008	Keynote presentation	50
Upward Bound student workshop, Palikir, Pohnpei	27 June and 11 July 2008	Two 3-hour workshops	80
Camp girls leading our world, Nihco Park, Pohnpei	11 June 2008	60-minute presentation	50
Health values for fish seminar, IFCP Training Center, Kolonia, Pohnpei	2 Sept. 2008	1.5 hour presentation with Japanese team	25
Nukuoro softball teams, IFCP Training Center, Kolonia, Pohnpei	5 and 19 Sept. 2008	40-minute presentation to players. Go Local and poster talk	38
Let's Go Local Club, Nett School class 4, Pohnpei	16 Sept. 2008	1-hour presentation, taught by high school club members	40
Pingelap Green Day, Kolonia, Pohnpei	20 Sept. 2008	Keynote presentation	100

Radio press releases, newspaper articles and e-mail releases were prepared for each activity. The IFCP standard "Go Local" talk was presented at each event, along with promotional materials and, often, fresh samples of rare banana varieties for display and tasting.
YINEC = Yap Interagency Nutrition Education Council.

- *Kolonia fun runs:* From 2007 to 2010, IFCP participated in six fun runs per year, coordinated by the FSM National Olympic Committee (NOC). IFCP gave short and inspiring pre- and post-run health talks, shared local food messages, and provided drinking coconuts and ripe bananas, including rare varieties, as healthy alternatives to imported soft drinks and snacks. In 2010, with help from FSM NOC, IFCP held its first Let's Go Local fun run, which had a record number of participants, with more than 300 youth and adults, and offered prizes relevant to local food production and consumption, such as machetes and shovels for planting, and local food items as raffle prizes.
- *IFCP-coordinated meetings and workshops:* These included strategic planning meetings, charcoal oven and food processing workshops, and meetings where rare banana varieties and other local foods were promoted. In 2009, with support from funding agencies, the Go Local project was expanded to additional communities in Pohnpei and one community in each of the other three FSM states: Kosrae, Chuuk and Yap.

Campaign slogans. The "Let's Go Local", "Going Yellow" and "Practise What You Preach"[8] slogans were used at the state and national levels, through e-mail, newspaper, radio, television and video communications. In 2007, IFCP coined an acronym summarizing the reasons for going local – the CHEEF[9] benefits of local

[8] Some referred to this as "Walk the Talk".
[9] This acronym is of particular relevance in communities where chiefs are prominent in the social organization.

foods are culture, health, environment, economics and food security.

Mass media: The mass media were used to share the promotional messages on local food, health and nutrition with a wider audience than could be reached through face-to-face encounters:

- *Radio* broadcasts reach the entire island and no costs are involved. Press releases were sent to the government radio station, which broadcast them several times in Pohnpeian and English, during news bulletins.
- *Television:* Pohnpei's local television station has a limited broadcasting range to only a few kilometres beyond Kolonia town and does not reach Mand community. Nevertheless, videos provided by the project were frequently broadcast.
- *Video/DVD:* These allow messages to be shared with Pohnpei families and communities that cannot be reached by television, and can be shown at meetings or in homes. Most of the project's eight videos and DVDs are in English, but a Pohnpei version of the main theme video *Going Yellow* was prepared in 2010 and continues to be popular among all ages.
- *Newspapers* are mainly in English with photographs. Although only about 1 100 copies are printed, many people share each copy, and electronic versions are available on national Web sites. More than 160 articles and recipes with photographs were written and published in a column for Kaselehlie Press, Pohnpei's biweekly newspaper, from June 2005 to July 2010. Printed articles were photocopied and distributed to selected locations and people.
- *Go Local e-mail network:* By 2010, the network had more than 700 participants, and sends messages (in English only) to academics, donor and development agencies and family members in all four states of FSM and in many other countries in the Pacific Islands and beyond. The network started in 2005, with updates on nutrition, local foods and activities issued to a small number of participants in Pohnpei. Comments from more than 200 participants were then gathered and disseminated in a discussion forum. E-mails are also distributed to the Regional Pacific Island Medical Distribution List (with more than 170 members) and PAPGREN News and Biodiversity for Nutrition. Individual and organizational recipients share the messages in their own professional and social networks.[10]
- *Web site and Facebook:* The IFCP Web site[11] was established in late 2005 and provides a wealth of information (mainly in English) on local food, health and the Mand project, providing access to a wider community – locally, nationally and internationally. It shares scientific papers, photos, promotional presentations and IFCP newspaper articles. In 2010, IFCP also established a page on Facebook.
- *"Let's Go Local" song:* This is used at meetings and workshops, and in video, radio and electronic media, including as the background theme to the *Going Yellow* video.[12] In 2009, a second song on the CHEEF benefits of local foods was composed for inclusion in IFCP presentations. The words for both songs were published in an international magazine (Englberger *et al.*, 2010a).

Print and other promotional materials.

- *IFCP local food posters:* These present the Yellow Varieties Message, with photos of varieties, nutrient contents (ß-carotene) and health messages. The posters required off-island printing[13] and became the main teaching tools for the Go Local campaign, through wide distribution (see IFCP Web site). Posters included "Pacific Indigenous Foods", produced by FAO/CINE in 2006,[14] and "No End to the

[10] One e-mail network participant commented: "I forward these bits of knowledge to my practicum teachers, each adds to the health lessons they are supposed to teach."
[11] www.islandfood.org
[12] The words are: "Let's go local, let's grow local, let's eat local, let's stay local; Vitamin A, good for eyesight, no heart problems, diabetes; Yellow varieties come from local, *Karat* banana and many others more."
[13] The posters involved food analysis at off-island laboratories and photography of rare varieties. The first poster required seven years to complete. Poster printing is now available on the island.

Banana", produced by Bioversity International in 2007[15] and reprinted by IFCP in 2008.

- *FSM postage stamps on local foods:* In collaboration with the FSM Postal Services, three stamp series were developed: i) a commemorative Karat series, released in 2005 at a ceremony with more than 50 invited guests;[16] ii) a series of eight Pohnpei carotenoid-rich banana varieties, released in 2006; and iii) a series on edible coconut items, soursop and banana varieties, released in 2010. Newspaper articles and radio news publicized the development and release of these stamps.
- Local food trends *newsletter:* Articles on the Go Local campaign, other local food activities, recipes and nutrition/health items were published in *Local food trends*, from 2005 to 2010.
- *Local food postcards:* Four postcards were distributed at meetings in Pohnpei and at regional and international meetings. These focused on Karat banana, giant swamp taro, pandanus, and fish and fishing as a healthy food and physical activity.
- *Bumper stickers* on *Karat* and breastfeeding were sold in local shops and offices, and distributed at meetings and workshops. The messages used were "*Karat*: Pohnpei State Banana" and "Breast is Best".
- *Governor's proclamation of* Karat *as the state banana of Pohnpei:* This brought additional prestige to this rare banana, which was very important in the past, including as an infant food. The proclamation, issued in 2005, provided recent scientific findings regarding *Karat*'s rich provitamin A carotenoid and other essential nutrient contents, and the related health benefits. Printed copies of the proclamation were distributed for display in offices and homes. *Karat* is now regularly sold at local markets. In 2006, the Banana Market Study documented that in an eight-week period eight of 14 local markets had sold Karat and other rare bananas; in 1998, none of them sold it.
- *Recipe collections and other printed matter*: Recipes collected from Mand families were published in a book (Levendusky, 2006), newspapers and other publications, accompanied by photographs. IFCP continues to receive requests for the recipe book. Other IFCP print materials, including posters, brochures and newsletters were distributed through the IFCP Training Center,[17] meetings and public events, local shops and offices, and the Pohnpei Tourist Office in Kolonia. Materials were provided free of charge for teaching purposes, and sold for personal use.
- *Other materials:* Promotional t-shirts proclaim the project slogans and illustrate valuable but underutilized traditional crops. IFCP staff and partners wear them at project activities, workshops and meetings, where they also serve as competition prizes. One staff member reported in 2010 that "Those t-shirts have become rather popular; people want to wear them." As a result, a local hotel and restaurant purchased 60 t-shirts to sell. Pens with IFCP contact details were also produced, in yellow with positive health messages – such as "Grow and Eat Yellow Varieties" – and in red, with health warnings and information on where to get advice. A heat-sensitive pencil that turns from orange to yellow in the heat (or in the hand) has proved particularly popular. Telephone cards and a two-page colour insert included in the FSM telephone directory also promote the campaign.

[14] This is part of an international series to promote indigenous foods globally, based on Pohnpei photos.
[15] This was shown in Ireland, the United Kingdom and the United States of America.
[16] Framed copies of the stamps were presented to agencies and are on display in public places. The *Going Yellow* video was premiered at the ceremony.
[17] The IFCP Training Center, established with extensive support from donor agencies, was opened on 21 May 2008, with an open house display, a charcoal oven demonstration and local food lunch, and an address from the Pohnpei State Governor.

Table 12.2 Selected Go Local activities and IFCP involvement in regional/international events, 2006 to 2008

Event	*Date*	*IFCP involvement*	*No. participants*
30th National Nutrient Databank Conference, Honolulu, Hawaii, USA	19–20 Sept. 2006	Oral presentation on provitamin A carotenoid in bananas and other Micronesian foods	100
1st International Breadfruit Symposium, Suva, Fiji	16–19 Apr. 2007	2 oral presentations	30
Eden Project, Cornwall, UK	16 Aug. 2007	Oral presentation, Go Local initiative, Pohnpei bananas and other local foods	16
Banana and sweet potato study and workshops, Makira, Solomon Islands	2–16 Oct. 2007	Oral presentations at workshops/ACIAR/HarvestPlus, SPC and Solomon Islands activity	700
Pacific Banana Strategy and PAPGREN Meeting, Suva, Fiji	9–16 Nov. 2007	Oral presentation on Pohnpei bananas and Go Local	35
2nd Conference on Health and Biodiversity, Galway, Ireland	25–28 Feb. 2008	Oral presentation on Go Local	200
International Symposium on Underutilized Plants, Arusha, United Republic of Tanzania	3–7 Mar. 2008	Oral presentation on Let's Go Local initiative in Pohnpei	250
CINE Case Studies Meeting, Bellagio, Italy	3–9 May 2008	Oral presentation on Pohnpei case study intervention chapter	30
Banana characterization training, South Johnstone, Australia	28–30 July 2008	Oral presentation on Pohnpei banana promotional materials	35
First Pacific Summit on Diabetes, Saipan, CNMI	8–12 Sept. 2008	Oral presentation on Go Local initiative for diabetes control, and display of promotional materials	150
Sweet potato and banana workshops, North Malaita, Solomon Islands and Lae, Papua New Guinea	2–19 Oct. 2008	Oral presentations at 10 workshops/ACIAR/HarvestPlus and Solomon Islands activity	680

These activities were reported in the *Kaselehlie Press*, on local V6AH radio and in the Island Food Go Local e-mail network. The IFCP standard Go Local talk was presented at each event, along with promotional materials.
CNMI = Commonwealth of the Northern Mariana Islands.

Youth involvement. In 2006, the Upward Bound administration asked IFCP to hold a six-week intensive health and nutrition course (an hour and a half a day, on four days per week) for 25 high school students who were selected based on their school performance and leadership qualities. The course improved the students' understanding of how their health is affected by what they eat, and the importance of local foods. The Upward Bound students went on to form the Let's Go Local High School Club of more than 50 students who are enthusiastic about promoting local foods. In 2007 and 2008 the club gave presentations on the values of local food to the community and in Pohnpei's three elementary schools and a women's technical school.

Assessment of local foods' nutrient contents. The resistant starch content of green banana varieties was analysed in collaboration with the University of Auckland, New Zealand (Thakorlal *et al.*, 2010). Recent studies indicate that resistant starch provides fibre and may help protect against diabetes.

Small-scale processing of local foods. Overseas consultants helped to develop skills and capacity for the drying and blending of local fruits to make fruit nectars. Workshops were held in Kolonia and Mand community, and experiments with solar and charcoal dryers were carried out. Market research was carried out in July 2007 to assess the attitudes and perceptions of market owners, consumers and local food advocates, and to list the product ranges of four food markets and six take-out restaurants. This assisted IFCP and partners in their local food promotion efforts.

Membership drive. In 2009, IFCP established membership rules and annual fees, and recruited more than 150 new members to help promote local foods. Each member receives a membership card and a subscription to the IFCP newsletter. In 2010, they also received IFCP t-shirts. Student, regular, institution and lifetime memberships are available.

Activities at the regional/international level

These led to additional funding support for project activities and encouraged participants by stimulating international recognition of the campaign's importance. Table 12.2 outlines IFCP's involvement in regional/international events, which contributed to the Go Local campaign.

Papers, articles, releases, displays/exhibitions and workshops. These disseminated a wealth of information to diverse audiences. Scientific papers and other materials provided a strong basis for the project's approach and credibility for its activities. Specific activities included:

- the Go Local e-mail network providing short updates on scientific findings and a forum for discussion and experience exchange among members;
- displays on Pohnpei bananas and IFCP's Go Local campaign – held in Cornwall, United Kingdom, and at Bioversity International's No End to the Banana exhibition[18] – which stimulated international interest in valuable FSM local foods, adding to the international prestige;
- scientific papers on findings about the nutrient contents of local foods;
- Pohnpei banana and taro chapters for a Pohnpei ethnobotany book;
- an overview of Pohnpei yam for a regional project;
- articles and releases for development journals and global Web sites;
- Go Local workshops in other Pacific Island countries, reaching more than 1 500 people in remote communities in the Solomon Islands and Papua New Guinea, and led by the Australian Centre for International Agricultural Research (ACIAR), HarvestPlus, and the Secretariat of the Pacific Community Centre for Pacific Crops and Trees;
- presentations at regional and international meetings, including the first Pacific Summit on Diabetes, from 8 to 12 September 2008 at Saipan World Resort, in the Commonwealth of the Northern Mariana Islands, which led to many further requests.

Collaborative research projects. The project collaborated with post-graduate and other university students to investigate the production and consumption of local foods and ways of promoting local foods in Micronesia. Topics included dietary assessment (Corsi, 2004), an assessment of agroforestry relating to diet and health (Shaeffer, 2006), banana marketing (Parvanta, 2006), marketed processed local food (Naik, 2008), Mand project evaluation (Kaufer, 2008; Bittenbender, 2010), challenges to local food availability (Clayton, 2009), youth attitudes and perceptions relating to local food (Greene-Cramer, 2009), resistant starch in Pohnpei banana cultivars (Thakorlal, 2009), diet in times of transition in a remote area of Pohnpei (Emerson, 2009), and food security issues (Del Guercio, 2010; Sears, 2010). Collaborating universities were Emory University, the University of Arizona and the University of Hawaii, all in the United States of America; the University of Auckland in New Zealand; and McGill University in Canada.

Community-level evaluation survey

To evaluate the effect of the promotional and intervention activities discussed in the previous subsections, two cross-sectional surveys were conducted: a baseline survey in June and July 2005; and a major evaluation survey in June and July 2007, after the intervention. A further evaluation focusing on diet was

[18] Presented at the Central Library of Leuven in Belgium; the Royal Botanic Garden, Edinburgh, and the Eden Project in the United Kingdom; the National Botanic Gardens of Ireland; the World Bank lobby in Washington, DC; and the Fairchild Tropical Botanic Garden in Florida, United States of America.

conducted in 2009, two years after the interventions had been completed, to determine whether the initial improvements documented in the earlier evaluation had persisted. A standardized protocol and trained interviewers were used.[19] The evaluations assessed changes in the dietary intakes, consumption patterns and health of people in Mand community. Health assessments and dietary interviews took place in Mand Community Hall during Mand Community Working Group meetings. Interviews were primarily in Pohnpeian or Pingelapese, and were transcribed in English. Participants were selected randomly as one adult woman per household. One criterion for inclusion in the 2009 analysis was that households had to have completed the dietary records in both 2005 (baseline) and 2007 (evaluation). The SAS statistical program (SAS Institute Inc., United States of America) was used for statistical analysis. A p value of ≤ 0.05 was considered significant.[20]

Dietary intake was assessed through two non-consecutive 24-hour recalls in 26 out of 44 households. Two individuals from 2005 and five from 2007 were excluded because of underreported data (Goldberg *et al.*, 1991), and 11 lactating women were excluded from nutrient analysis owing to their extreme nutrient requirements. The data were analysed using modified Pacific Island food composition software.[21]

Food frequency was assessed with a seven-day FFQ of 33 food items and 200 sub-items.[22] Data from a total of 40 households were analysed. Each participant was asked to give the number of days in the last seven that a main item had been consumed, and whether sub-items had been consumed at any point during the seven days.

The diversity of foods consumed was assessed systematically. Three scores of dietary diversity were defined and computed: food group diversity (the numbers of total, local and imported food groups consumed); species diversity (the numbers of individual total, local and imported species consumed); and food variety (the numbers of individual total, local and imported varieties consumed).

Anthropometry (weight, height and waist circumference), FGB and blood pressure were measured to assess health status, using standard methods (WHO, 1997).

Additional assessments were carried out to test participants' knowledge, awareness and behaviour patterns regarding project activities. Questions included how and where the participant had heard about the project, who in the family participated, and what lessons had been learned.

The 2009 diet assessment utilized similar methodology as in 2005 and 2007: a seven-day FFQ and two days of 24-hour recalls, collected via door-to-door surveys of the same households as previously studied. Because of migration, changes in household composition and deaths, the number of households surveyed was reduced from 40 to 36.

Results of promotion and intervention activities

Among the many challenges to implementing this project in FSM were the convenience, low cost and high status of imported foods in relation to local foods, and the important role that imported foods and drinks have assumed in people's diets, which makes it difficult to change course. Also important were the lack of awareness that many people have regarding the relationships among diet, lifestyles and health, and the difficulty in storing, transporting and marketing local foods compared with imported processed foods. A dearth of awareness-raising and educational materials relevant to local Pacific Island foods and local varieties led to the use of less relevant and appropriate materials.

FSM faces major challenges owing to its remote location, geographic dispersion, multiple cultures and languages, and the threats of climate change. FSM comprises a small land mass surrounded by a million square miles (about 2.6 million km^2) of ocean, so

[19] The 2007 research team included 12 officers from eight agencies, nine of whom were in the 2005 team (of four interviewers, two nurses and three research assistants). Three of the four interviewers took part in both 2005 and 2007.
[20] Proc MIXED was used to examine change in dependent variables as continuous quantitative data with a normal distribution. Normality was tested with Proc Univariate, using a Shapiro-Wilk statistic (p value > 0.01 indicated normality). If normality was not met, power transformations were used (in the order of logarithm, square root, cube root, fourth root).
[21] FoodWorks Professional Edition (version 4.0, Xyris Software, Australia).
[22] The FFQ was modified from those previously developed for FSM (Englberger, 2003; Corsi *et al.*, 2008).

national meetings with representatives from all four states are costly, as great distances have to be travelled. English is the government language in all states, but the use of eight official local languages and additional dialects, and cultural differences are challenging for the development of state and national programmes and policies.

Documentation phase

Very little was known about specific varieties of Pohnpei's local foods prior to 1998, when efforts were made to identify local foods that could alleviate the emerging vitamin A deficiency problem. Key informants mentioned *Karat*, an unusual banana variety with deep yellow/orange flesh, which indicates the presence of provitamin A carotenoids. Samples were taken and analysed for provitamin A carotenoids and other nutrients at off-island laboratories, as there are no laboratories in FSM.

These analyses confirmed that *Karat* is rich in ß-carotene, the most important of the provitamin A carotenoids, and other essential nutrients.[23] Other yellow- and orange-fleshed varieties/cultivars of banana, giant swamp taro, breadfruit and pandanus were analysed and identified as containing substantial concentrations of carotenoids, essential minerals and other nutrients (Englberger *et al.*, 2003a; 2003b; 2006a; 2008; 2009a).

There are more than 50 varieties of banana in Pohnpei, with flesh coloration varying from white and cream, to yellow, yellow/orange and orange. In general, the deeper the colour of a variety's flesh the greater the carotenoid content. Similarly, giant swamp taro, breadfruit and pandanus varieties vary by intensity of flesh coloration and associated carotenoid content. Foods rich in ß-carotene and other provitamin A carotenoids protect against vitamin A deficiency disorders (infection and night blindness), anaemia (weak blood) and cancer, heart disease and diabetes (McLaren and Frigg, 2001). The Yellow Varieties Message was developed to relay the concept that consuming these varieties offers important nutrients and health benefits (Englberger *et al.*, 2006b).

As well as documenting carotenoid-rich foods, the project also documented the vast diversity of traditional foods available on Pohnpei (Englberger *et al.*, 2009b).

Results of community-level activities

Meetings in Mand were important for raising awareness about the positive values of local foods and were effective in promoting local foods. Responses indicated that people enjoyed consuming traditional dishes, some of which they had not tasted for a long time.[24]

Attitude towards local foods. The promotion of local foods had a great impact in the community, despite occasional difficulties in mobilizing family members to join activities. There was a clear change in people's attitude towards local foods, as evident from the following comments made by community members:

> People are now talking more about local food at informal gatherings and there is more local food at church feasts, such as Easter.
>
> There is more local food at cultural events. During the Easter 2008 event, very little rice was brought. In the past it was the major food item. Also people ate more of the local food, leaving the rice. Coconuts were served and there were hardly any soft drinks. Hot dog was not seen. The main protein foods were fish and chicken, whereas previously fatty spare ribs were a main item.
>
> Since the project I cannot get the coconuts from my Adohl tree. People are always taking them now! I tell you it is a very effective programme, when we have our special gatherings we now have local food dishes, and we say "Go Local". The way they cook the food now is different, and we talk about how local food is good for the body.
>
> People are starting to say "Where is the local food?" at community events serving food (previously they were happy with rice and other imported foods).

[23] Analyses also found that *Karat* is rich in riboflavin (vitamin B_2) (Englberger *et al.*, 2006a).

[24] "I feel good eating *apior* [edible coconut husk from the *Adohl* variety, tied with pieces of mature coconut]. My grandmother gave me this when I was sick. It is such a long time since I had it." Mand woman.

> It is important to teach children the importance and value of their traditional foods.
> When we were children, we used to eat kaikes seeds. They tasted good. We need to teach our children today to eat them.

Project leaders indicated other community benefits from the project, such as the carving of three new canoes for fishing, learning the names of more fish, and the provision of training opportunities in areas of interest. Prior to the project, there were no canoes in Mand, and people knew the names of only a few fish. The project documentation phase helped young people to learn the names of many rare fish, while training and awareness-raising opportunities for adults included the container gardening training, the United States Ambassador's local food pot luck dinner, and a half-day planning workshop involving academic and community leaders from CINE's Indigenous Peoples' Food Systems for Health Program, Professor Kuhnlein and Chief Erasmus from Canada.

Dietary intervention

Tables 12.3 to 12.8 summarize the results from the dietary evaluation, which are presented in full by Kaufer (2008) and Kaufer *et al.* (2010). Significant dietary changes were observed in the Mand community. There were a significant reduction in the consumption of rice (Tables 12.3 and 12.5), a significant increase in the intake of provitamin A carotenoid (Table 12.4), increases in the frequencies of consumption of banana,

Table 12.3 Top foods consumed by Mand community, Pohnpei, 2005 and 2007

	2005			*2007*	
Source	***Food item***	***Average adult consumption*** *(g/day)*	***Source***	***Food item***	***Average adult consumption*** *(g/day)*
Imported	Rice	846.9	Imported	Rice	544.1*
Local	Banana, all	131.0	Local	Banana, all	170.2
Local	(Fresh) fish	127.8	Imported	Chicken	149.8
Imported	Chicken	111.0	Local	Coconut products	94.2
Local	Breadfruit	80.8	Local	Taro, giant swamp	92.3
Imported	Sugar products	71.8	Local	Breadfruit	88.8
Local	Coconut products	41.5	Local	(Fresh) fish	87.9
Imported	(Canned) fish	39.5	Imported	Sugar products	62.1
Imported	Ramen noodles	35.6	Imported	(Canned) fish	52.9
Local	Taro, giant swamp	30.8	Imported	Ramen noodles	29.6
Local	Local fruit	21.4	Local	Local fruit	22.7
Imported	Canned meat	20.1	Imported	Imported fruit	20.7
Local	Pork	14.4	Imported	Donut	20.1
Imported	Bread	14.2	Imported	Bread	18.1
Imported	Donut	13.4	Local	Pork	16.5
Quantity of local food consumed		**471.3**	**Quantity of local food consumed**		**618.3**
Quantity of imported food consumed		**1 201.2**	**Quantity of imported food consumed**		**951.3**

Data calculated from two 24-hour recalls on non-consecutive days, from non-lactating women; reported as average daily consumption (26 households per year, one woman per household); collected in same time period both years (June, July), but breadfruit season may vary from year to year.
* Significant decrease from 2005 ($p = 0.0002$).
Canned fish = canned mackerel, tuna and sardines.
Coconut products = cream, flesh, juice and germinating.
Fresh fish = all local fish (tuna, mackerel and reef fish).
Local fruit = excluding banana; including pineapple, pawpaw, pandanus and malay apple.
Sugar products = granulated sugar added to food, and drinks containing sugar.
Source: Kaufer, 2008.

Table 12.4 Average daily energy and nutrient intakes of Mand community, Pohnpei, 2005 and 2007

	2005		*2007*		
	*LS mean**	*% energy*	*LS mean**	*% energy*	*p value*
Total					
Energy (kJ)	**9 879.3**		**8 833.4**		**0.04[a]**
Carbohydrate (g)	**354.6**	**59.8**	**303.7**	**56.5**	**0.03**
Protein (g)	100.7	17.0	92.7	17.3	0.39[a]
Fat (g)	61.3	23.3	62.6	26.2	0.82
Vitamin C (mg)	43.2		61.8		0.08[a]
Vitamin A (µg)	176.5		193.2		0.59[a]
Retinol (µg)	176.0		148.1		0.30
ß-carotene equivalents (µg)	**226.6**		**475.7**		**0.02[a]**
		% total[§]		*% total[§]*	
Local food					
Energy (kJ)	2 286.2	23.2	2 127.6	24.3	0.71[be]
Carbohydrate (g)	51.1	14.8	70.3	24.6	0.24[b]
Protein (g)	31.9	33.9	20.1	23.5	0.06[ce]
Fat (g)	**18.6**	**33.3**	**11.3**	**20.1**	**0.04[b]**
Vitamin C (mg)	42.0	97.6	55.0	97.0	0.21[b]
Vitamin A (µg)	92.3	52.8	80.4	46.1	0.59[b]
Retinol (µg)	**53.4**	**43.1**	**19.0**	**18.1**	**0.02[b]**
ß-carotene equivalents (µg)	**202.1**	**68.6**	**511.6**	**79.7**	**0.02[b]**
Imported food					
Energy (kJ)	7 587.7	76.8	6 624.5	75.7	0.09
Carbohydrate (g)	**294.5**	**85.2**	**216.1**	**75.4**	**0.0007**
Protein (g)	62.2	66.1	65.2	76.5	0.68[a]
Fat (g)	37.1	66.7	45.0	79.9	0.10[a]
Vitamin C (mg)	1.0	2.4	1.7	3.0	0.54d[e]
Vitamin A (µg)	82.3	47.2	94.1	53.9	0.55[a]
Retinol (µg)	70.6	56.9	85.8	81.9	0.42[a]
ß-carotene equivalents (µg)	92.3	31.4	130.0	20.3	0.64[e]

Data calculated from two 24-hour recalls on non-consecutive days, from non-lactating women; reported as average daily consumption (26 households per year, one woman per household); collected in same time period both years (June, July), but breadfruit season may vary from year to year.
Bold denotes significant difference.
* Least square mean estimate: standard errors (SEs) of least square mean estimates cannot be obtained for transformed variables, thus SEs are not presented. Variance parameters are provided in the complete evaluation (Kaufer, 2008).
§ Because total, local and imported intakes were analysed separately, the LS means for local and imported do not exactly equal the LS mean for total. For comparison, percentage of total was calculated from the sum of the LS means for local and imported.
[a] Log transformation.
[b] Square root transformation.
[c] Cube root transformation.
[d] Fourth root transformation.
[e] Unable to find power transformation producing normality; used the closest to normality.
Source: Adapted from Kaufer, 2008.

Table 12.5 Frequencies of consumption of selected foods in Mand community, Pohnpei, 2005 and 2007

Food item	Weekly consumption LS means[a] 2005	2007	p value
Local			
Banana, all	**2.6**	**3.9**	**0.0001**
Banana, white-fleshed	2.9	2.9	0.86
Banana, yellow-fleshed	0.5	0.7	0.13
Breadfruit	4.0	3.8	0.41
Coconut fat	1.7	1.3	0.15
Drink, local	**2.4**	**3.2**	**0.01**
Fish, local	3.9	4.2	0.42
Fruit, local[b]	3.5	4.0	0.10
Meat, local	1.5	1.1	0.06
Nuts, local	**0.2**	**0.6**	**0.01**
Pandanus	0.0	0.0	1
Snack, local	**0.3**	**0.7**	**0.01**
Starch, other[c]	0.1	0.3	0.07
Taro, giant swamp	**0.2**	**0.9**	**≤ 0.0001**
Vegetable, local	**1.4**	**3.3**	**≤ 0.0001**

Food item	Weekly consumption LS means[a] 2005	2007	p value
Imported			
Dairy[d]	0.6	0.8	0.25
Drink, imported, with sugar[e]	**2.0**	**3.6**	**≤ 0.0001**
Egg	**1.1**	**1.6**	**0.03**
Fish, imported	2.4	2.7	0.46
Flour products	**4.1**	**5.0**	**0.008**
Fruit, imported	**0.8**	**0.2**	**0.0004**
Meat, imported	**1.7**	**2.6**	**0.003**
Rice	**6.8**	**6.1**	**≤ 0.001**
Snack, imported	0.3	0.4	0.4
Sugar, imported products or added to local food[f]	**3.2**	**1.9**	**0.0002**
Turkey tail	0.2	0.2	0.65
Vegetable, imported	0.5	0.6	0.32
Imported and local			
Fat, imported/animal	2.1	2.4	0.46
Fried food	2.1	2.3	0.45
Fruit, all	**3.0**	**4.5**	**≤ 0.0001**
Liver	**0.1**	**0.5**	**0.001**
Vegetable, all	**1.5**	**3.4**	**≤ 0.0001**

Data calculated from a seven-day FFQ, from 40 households per year, from one woman per household.
Bold denotes significant difference.

Source: Kaufer, 2008.

[a] Least square mean estimate: standard error (SEs) of least square mean estimates cannot be obtained for transformed variables, thus SEs are not presented.
[b] Includes ripe banana, excludes pandanus.
[c] Includes dryland taro, yam, cassava, sweet potato.
[d] Includes butter, margarine, cheese, milk.
[e] Includes soft drinks, coffee, tea, Kool-Aid.
[f] Includes donuts and sugar added to local food and/or local drink.

giant swamp taro and vegetables (including green leafy vegetables) (Table 12.5), and an increase in the diversity of local foods (Table 12.6).

Increased dietary diversity was a major achievement, with the total food (local and imported combined) and local food diversity scores increasing in all aspects: by food group, species diversity, and food variety scores (Table 12.6). The mean diversity score for local foods increased between 2005 and 2007, in all three diversity measures.[25]

[25] When the difference in local food diversity scores between 2005 and 2007 was tested with Proc GLIMMIX binomial distribution, all three diversity score groups increased significantly by $p \leq 0.0001$.

Another major achievement was the decrease in rice consumption. The average daily consumption of rice in 2005 was 846 g per person, compared with 544 g in 2007. This reduction was significant ($p < 0.0002$) (Table 12.3). Similarly, the frequency of rice consumption decreased from 6.8 days per week in 2005 to 6.1 days in 2007 ($p < 0.001$) (Table 12.5).

Although the data revealed decreased reliance on imported rice as a food source, there was no significant increase in overall energy intake from local food sources between 2005 and 2007. In 2007, 24.2 percent of energy was from local foods (and 75.7 percent from

Table 12.6 Dietary diversity in Mand community, Pohnpei, 2005 and 2007

	2005		2007			
	LS means[a]	Range	LS means[a]	Range	p value[b]	p value[c]
Food group score						
Total *(n = 14)*	10.1	6–13	10.9	6–14	**0.04**	**0.04**
Local *(n = 6)*	4.8	2–6	5.5	4–6	**0.001**	**≤ 0.0001**[d]
Imported *(n = 8)*	5.3	2–7	5.4	2–8	0.74	0.74[d]
Species diversity score						
Total *(n = 72)*	12.4	7–18	18.1	9–29	**≤ 0.0001**	**≤ 0.0001**
Local *(n = 51)*	12.3	3–11	17.3	5–23	**≤ 0.0001**	**≤ 0.0001**
Imported *(n = 21)*	5.2	2–8	6.0	3–11	0.14	0.06
Food variety score						
Total *(n = 166)*	21.3	11–31	32.5	14–66	**≤ 0.0001**	**≤ 0.0001**[d]
Local *(n = 100)*	11.8	4–19	19.5	8–43	**≤ 0.0001**	**≤ 0.0001**[d]
Imported *(n = 66)*	9.4	3–16	12.8	5–24	**≤ 0.0001**	**0.0003**

Data calculated from a seven-day FFQ, from 40 households, from one woman per household.
Bold denotes significant difference.
[a] Least square mean estimate: standard errors (SEs) of least square mean estimates cannot be obtained for transformed variables, thus SEs are not presented.
[b] Year effect tested with Proc GLIMMIX, binomial distribution.
[c] Year effect tested with Proc MIXED with arcsine transformation.
[d] Non-normal distribution.
Food group score = number of different food groups consumed by the individual over the reference period,
Local food groups (n = 6) = starchy staples, meat and nuts (including fish), fruit, vegetables, fat, and snacks.
Imported food groups (n = 8) = starchy staples, meat and nuts (including fish), fruit, vegetables, fat, snacks, dairy, and sweets.
Species diversity score = number of unique individual species, excluding cultivars, consumed over the reference period.
Food variety score = number of all food items and sub-items, including cultivars, consumed over the reference period.
Source: Kaufer, 2008.

imported), while in 2005 it was 23.2 percent (Table 12.4). Imported chicken, other imported protein foods, sugar and flour products were major food items in both 2005 and 2007 (Tables 12.3 and 12.5).

Three local foods registered significant increases in their frequencies of consumption: banana increased from 2.6 days/week in 2005 to 3.9 days in 2007; giant swamp taro from 0.2 to 0.9 days/week; and local vegetables, such as chilli leaves, *chaya*, *pele* and Brazilian spinach, from 1.4 to 3.3 days/week ($p \leq 0.0001$) (Table 12.5).

Consumption of ß-carotene equivalents also registered a significant increase, from 202.1 µg in 2005 to 511.6 µg in 2007 ($p \leq 0.02$) (Table 12.4). This included ß-carotene and other provitamin A carotenoids that contribute to vitamin A status.

The evaluation revealed some inconsistencies in the results reported: there was a significant increase in the frequency of consuming some unhealthy food items, including white flour products and sweet drinks, but a significant decrease in the frequency of items with sugar (Table 12.5), indicating possible underreporting of these items.

The 2007 dietary intake evaluation found that rice was the highest overall contributor of energy (30.4 percent), imported chicken contributed the most protein and fat (39.0 and 34.8 percent, respectively), banana the most vitamin C (29.1 percent), fish the most vitamin A (27.9 percent), and green leafy vegetables the most ß-carotene (55.7 percent) (results not shown in table).

Tables 12.7 and 12.8 show the frequencies of consumption of imported and local foods for 2005 and 2007. Results reveal that the consumption of local foods increased while that of imported foods remained constant. A total of 14 different banana cultivars were consumed and eight green leafy vegetables, while the intake of lemon grass increased between 2005 and

Table 12.7 Dietary diversity in Mand community, Pohnpei, 2005 and 2007

		7-day FFQ counts/week		*24-hour recalls counts/2 days*	
Food group/Imported food	***Description***	***2005***	***2007***	***2005***	***2007***
Starch					
Rice	White	40	38	39	39
Wheat	Ramen, bread, flour	35	40	30	34
Meat					
Chicken	Meat, egg	20	34	27	30
Beef products	Canned meat, hamburger	23	19	13	6
Turkey	Turkey tail	5	7	0	2
Fish					
Mackerel	Canned	22	28	12	13
Sardines	Canned	1	5	0	1
Tuna	Canned	18	21	13	9
Nut					
Peanuts	Whole, butter	0	3	3	4
Dairy					
Dairy products	Milk, ice cream, cheese	10	16	3	3
Vegetable					
Broccoli		n/a	n/a	2	1
Cabbage	European	2	3	3	2
Carrot		1	6	3	2
Chilli		n/a	n/a	1	0
Maize		0	1	4	0
Cucumber		3	0	0	0
Garlic		n/a	n/a	0	4
Lettuce		1	0	0	0
Onion		n/a	n/a	2	7
Potato	Fresh, canned	0	3	3	2
Tomato	Fresh, canned	1	2	1	2
Fruit					
Apple		2	2	0	1
Grapes		1	0	0	0
Guava	Juice	n/a	n/a	0	1
Orange	Whole, juice	1	0	2	1
Pineapple	Canned	8	3	0	2

Data calculated from a seven-day FFQ and two 24-hour recalls, from 40 households per year, from one woman per household; presented as counts per week and counts per two days.
n/a = food did not appear on the FFQ.
Source: Kaufer, 2008.

Table 12.8 Dietary diversity in Mand community, Pohnpei, 2005 and 2007

			7-day FFQ counts/week		24-hour recalls counts/2 days	
Common name	*Cultivar, description or local names: Pohnpeian (Pingelapese)*	*Scientific name**	*2005*	*2007*	*2005*	*2007*
Starchy staple						
Breadfruit	*Mahi (mei)*	*Artocarpus altilis/mariannensis*	38	33	22	22
	Ripe unseeded		16	13	n/c	n/c
	Green unseeded		15	22	n/c	n/c
	Green seeded		0	2	n/c	n/c
	Ripe seeded		0	3	n/c	n/c
Taro, dryland	*Sawa (sewa)*	*Colocasia esculenta*	5	4	1	5
Taro, giant swamp	*Mwahng (mweiang)*	*Cyrtosperma merkusii*	9	17	6	9
Yellow-fleshed	*Pwiliet (Pwilies)*		2	5	n/c	n/c
Yellow-fleshed	*Simihden*		0	2	n/c	n/c
Yellow-fleshed	*Sounpwong Weneu*		0	1	n/c	n/c
Yellow-fleshed	*Tekatek (Sekasek)*		0	3	n/c	n/c
Yam	*Kehp*	*Dioscorea* spp.	0	6	1	0
Tapioca	*Kehp tuhke (dapiohka)*	*Manihot esculenta*	0	2	0	1
Sweet potato	*Pidehde*	*Ipomea batatas*	0	3	0	1
Banana	*Uht (wis)*	*Musa* spp.	33	36	23	24
White-fleshed	*Inahsio (Aroh wis)*		2	5	0	2
White-fleshed	*Kaimana (Lokoei)*		14	15	3	8
White-fleshed	*Utin Menihle*		7	14	0	1
White-fleshed	*Pihsi/Fiji*		8	13	1	5
White-fleshed	*Utin Ruk (Wis in Ruk)*		8	13	19	11
White-fleshed	*Utin Wai (Wis in Wai)*		n/a	n/a	0	1
Yellow-fleshed	*Akadahn (Lakadahn)*		2	1	0	1
Yellow-fleshed	*Karat (Wis Karat)*		0	3	0	0
Yellow-fleshed	*Daiwang*		6	7	5	2
Yellow-fleshed	*Utimwas*		0	2	0	0
Yellow-fleshed	*Utin Iap (Wis in Iap)*		0	1	0	0
Yellow-fleshed	*Utin Kerenis*		0	1	0	0
Yellow-fleshed	*Utin Rais/Kudud (Sendohki)*		2	1	0	1
Nuts						
Chestnut	*Mworopw (mwerepw)*	*Inocarpus fagifer*	8	14	1	0
Fish						
Tuna, skipjack, yellowfin	*Lesapwil; pweipwei*	*Katsuwonus pelamis; Thunnus albacares*	13	20	17	19
Reef fish	Fresh, dried	More than 100 different fish	28	33	14	20
Mackerel	Double-lined mackerel *(pweir)*	*Grammatorcynus bilineatus*	n/a	n/a	6	2

(Continued)

Table 12.8 *(Continued)* Dietary diversity in Mand community, Pohnpei, 2005 and 2007

			7-day FFQ counts/week		24-hour recalls counts/2 days	
Common name	*Cultivar, description or local names: Pohnpeian (Pingelapese)*	*Scientific name**	*2005*	*2007*	*2005*	*2007*
Other seafood						
Crab, mangrove	*Elimoang*	*Scylla sirreda*	0	1	1	0
Lobster	*Urehna*	*Panilurus* spp.	0	2	0	0
Shrimp	*Likedepw*	*Palaemon serrifer*	1	3	0	0
Meat						
Chicken	*Malek*	*Gallus domesticus*	5	7	0	1
Dog	*Kidi*	*Canis familiaris*	1	0	0	0
Duck	*Deki*	*Aytha fuligula*	0	1	0	0
Pork	*Pwihk (koaso/pwihk)*	*Sus scrofa*	17	18	14	11
Green leafy vegetables						
Pumpkin	*Pwengkin*	*Cucurbita moschata*	0	1	0	2
Chilli	*Sele*	*Capsicum annuum*	2	4	0	2
Kangkong, swamp cabbage	*Kangkong*	*Ipomoea aquatica*	4	6	0	2
Pele	*Bele*	*Hibiscus manihot*	2	8	0	0
Brazilian/Okinawan spinach	*Spinis*	*Alternanthera sissoo; Gynura crepidioides*	0	13	3	6
Chinese cabbage	Cabbage	*Brassica chinensis*	2	14	2	5
Chaya	*Chaya*	*Cnidoscolus chayamansa*	3	15	1	3
Drumstick	*Moringay* (drumstick)	*Moringa oleifera*	n/a	n/a	0	1
Other vegetables						
Beans	*(Pihns)*	*Vigna sesquipedalis*	0	4	0	0
Bell pepper	Bell pepper	*Capsicum annuum*	1	11	0	1
Cucumber	*Kiuhri*	*Cucumis sativus*	7	13	6	3
Eggplant	*Nasupi (eggplant)*	*Solanum melongena*	0	7	0	1
Ginger	*Sinter (sinser)*	*Zingiber officinale*	n/a	n/a	1	0
Leek	*Nira (lihk)*	*Allium schoenoprasum*	0	4	0	0
Onion, green	*Nengi*	*Allium cepa*	1	8	0	1
Tomato	*Domado*	*Lycopersicon esculentum*	0	4	0	2
Fruit						
Rose apple, bell apple	*Apeltik (apolsikisik)*	*Eugenia jambos*	1	6	0	0
Citrus	*Karer, karertik (karersik)*	*Citrus aurantifolia*	0	13	9	11
Guava	*Kuahpa*	*Psidium guajava*	3	9	2	0
Mango	*Kehngid*	*Mangifera indica*	5	2	0	0
Mountain apple	*Apel en pohnpei*	*Syzygium malaccensis*	0	20	1	2
Pandanus	*Kipar*	*Pandanus tectorius*	2	2	2	0
	Swaipwehpwe		0	1	n/c	n/c
	Aspwihrek		1	0	n/c	n/c

(Continued)

Table 12.8 *(Continued)* Dietary diversity in Mand community, Pohnpei, 2005 and 2007

			7-day FFQ counts/week		24-hour recalls counts/2 days	
Common name	*Cultivar, description or local names: Pohnpeian (Pingelapese)*	*Scientific name**	*2005*	*2007*	*2005*	*2007*
Fruit *(cont.)*						
Papaya	*Memiap (keiniap)*	*Carica papaya*	4	15	1	2
Pineapple	*Pweinaper (pweiniaper)*	*Ananas comosus*	10	17	8	5
Soursop	*(Sei)*	*Annona muricata*	1	1	0	1
Starfruit	*(Ansu)*	*Averrhoa carambola*	n/a	n/a	1	0
Watermelon	*Sihka (wedamelen)*	*Citrullus vulgaris*	0	6	0	1
Drinks/spices						
Cinnamon	*(Madeu)*	*Cinnamomum carolinense*	3	8	1	0
Lemongrass	Lemon grass	*Cymbopogon citratus*	0	11	1	2
Sugar cane	*Sehu (seu)*	*Saccharum officinarum*	8	14	0	1
Coconut						
Mature coconut, embryo	*Ering, pahr*	*Cocos nucifera*	45	36	30	24

Data calculated from a seven-day FFQ and two 24-hour recalls, from 40 households per year, from one woman per household; presented as counts per week and counts per two days.
n/a = food did not appear on FFQ.
n/c = not captured in 24-hour recall.
Sources: Kaufer, 2008; * species names from Englberger *et al.*, 2009b, verified from The International Plant Names Index and FAO databases.

2007. The change in reliance on imported versus local food was not significant in terms of contribution to daily energy. In 2005, about 23 percent of energy came from local food sources and about 77 percent from imported foods, whereas in 2007, the equivalent figures were about 24 and 76 percent.

Assessment of the diet in 2009 showed that the increase in giant swamp taro consumption, from about zero days a week in 2005 to 1.4 in 2007, had been maintained in the 36 households participating in the survey. Another sign of sustained change in attitudes to local and imported foods and improved understanding of the relationship between food and health, was the ban on soft drinks at community events that the Mand community imposed in 2010.

Health status

Table 12.9 shows results of the health assessments for 2005 and 2007. Overall, there were no significant changes in health indicators. Overweight and abnormal FBG levels are still serious problems in FSM:

- *Body mass index (BMI)*: Only 13 percent of the population had normal BMI in 2005, rising to 19 percent in 2007; there was no underweight, but there was a high prevalence of obesity. Detailed observation revealed that the young adult age group (18 to 29 years) had a mean BMI of 30, indicating high health risk. The mean BMI among women (34) was significantly higher than that among men (29).
- *Waist measurement:* There was no significant difference in average waist circumference between 2005 and 2007. More than 70 percent of the sample population had waist circumferences exceeding 88 cm (the cut-off for women) or 102 cm (the cut-off for men), indicating high risk for obesity-related illnesses (based on sex-specific cut-offs).
- *FBG:* There were no significant differences in FBG concentrations or classification categories (normal, abnormal) between 2005 and 2007, or between genders. However, FBG significantly

Table 12.9 Results from health assessments in Mand community, Pohnpei, 2005 and 2007

Outcome	No. individuals/ year	Descriptive statistics			Statistical analysis	
			2005	2007	Least square mean[a]	p value[a]
BMI *(kg/m²)*	68	Median	30.6	31	[c]	
Normal: 18–24.9		Range	18.3–50	20–51.9	**Year:** 2005 = 31.4; 2007 = 31.4.	**Year** (p = 0.78)
Overweight: 25–29.9		***BMI***	***n (%)***	***n (%)***	**Gender:** male = 29.24; female = 33.55	**Age** (p = 0.46)
Obese: 30–39.9		Normal	9 (13)	13 (19)	**Age:**[b] A = 30.8; B = 31.6; C = 30.9;	**Gender** (p = 0.005)
Very obese: ≥ 40		Overweight	21 (31)	16 (24)	D = 30.9; E = 32.9	
		Obese	31 (46)	32 (47)		
		Very obese	7 (10)	7 (10)		
Waist circumference *(cm)*	42	Median	98	100.5	[c]	
Increased risk:		Range	71.2 – 131.4	71.2 – 129.5	**Year:** 2005 = 98.12; 2007 = 98.21.	**Year** (p = 0.94)
Female: > 88		***Waist circumference***	***n (%)***	***n (%)***	**Gender:** male = 95.43; female = 100.9	**Age** (p = 0.05)
Male > 102		Increased risk	32 (76)	30 (71)	**Age:**[b] A = 90.11; B = 99.95; C = 101.35; D = 99.58; E = 99.84	**Gender** (p = 0.16)
FBG *(mg/dl)*	108	Median	111	114	[d]	
Normal: < 126		Range	79–436	85–496	**Year:** 2005 = 128.2; 2007 = 129.1.	**Year** (p = 0.74)
Abnormal: ≥ 126		***FBG***	***n (%)***	***n (%)***	**Gender:** male = 124.7; female = 132.8.	**Age** ($p \leq 0.0001$)
		Normal	71 (66)	67 (62)	**Age:**[b] A = 110.49; B = 110.2; C = 142.0; D = 140.8; E = 151.4	**Gender** (p = 0.17)
		Abnormal	37 (34)	41 (38)		
Blood pressure *(mmHg)*	112	***Systolic blood pressure***			Systolic[c]	
Optimal/normal: <130/85		Median	110	110	**Year:** 2005 = 114.8; 2007 = 115.1.	**Year** (p = 0.85)
High normal: 130–139/85–89		Range	90–195	90–180	**Gender:** male ≤ 116.6; female ≤ 113.3	**Age** (p = 0.28)
mild/borderline hypertension: 140–159/90–99					**Age:**[b] A = 101.4; B = 107.8; C = 114.9; D = 122.2; E = 128.4	**Gender** (p = 0.0001)
Hypertension: ≥160/100		***Diastolic blood pressure***			Diastolic[c]	
		Median	70	70	**Year:** 2005 = 72.6; 2007 = 73.1.	**Year** (p = 0.64)
		Range	40–120	50–98	**Gender:** male = 74.1; female = 71.6	**Age** (p = 0.16)
		Blood pressure	***n (%)***	***n (%)***	**Age:**[b] A = 66.1; B = 68.1; C = 74.3; D = 75.7; E = 80.0	**Gender** ($p \leq 0.0001$)
		Optimal/ normal	93 (83)	89 (80)		
		High normal	8 (7)	9 (8)		
		Mild/ borderline Hypertension	7 (6)	8 (7)		
		Hypertension	4 (4)	6 (5)		

[a] Proc MIXED (outcomes as continuous variables). Standard errors (SEs) of least square mean estimates cannot be obtained for transformed variables, hence SEs are not presented.
[b] Age categories: A = 18–29 years; B = 30–39 years; C = 40–49 years; D = 50–59; E 60 years and more.
[c] No transformation.
[d] Reciprocal transformation.
Source: Kaufer, 2008.

Table 12.10 Process indicators for intervention activities for Mand community, Pohnpei, 2005 to 2007

Activity	*% awareness[a] (n = 42)*	*% exposure[b] (n = 42)*	*Duration*	*Frequency*	*No. meetings/visits*	*No. participants*	*No. regular participants*
Community Working Group	93	60	2 years	Weekly/ bimonthly	78	126	11
Youth school education	76	33	8 months	Varied	13	42	n/a
Youth Drama Club	88	29	6 months	Monthly	6 meetings in 2006; 3 performances	20 in first; 10 in second	n/a
Breastfeeding Club	83	33	7 months	Bimonthly	12	43	34
Planting material distribution	86	50	8 months	Throughout	n/a	34	n/a
Home gardening	76	48	12 months	Varied	5	20 at first workshop	n/a
Cooking training	83	50	10 days	Once	10	25	n/a
Charcoal oven	90	50	4 weeks	4 weeks for construction and distribution	8	34	n/a
USA Ambassador's dinner	57	21	Once	Once	1	90 (15 from Mand)	n/a
Planting and weight loss competitions	71	50	2 years	2 planting competitions, 1 weight loss competition	n/a	First planting competition: 23	n/a

Data obtained from sources including IFCP intervention log, newspaper articles and questionnaires.

increased with age, especially for those aged 40 years and more. The prevalence of diabetes (FBG ≥ 126mg/dl) was 34 percent in 2005 and 38 percent in 2007.

- *Blood pressure:* More than 80 percent of the sample population had blood pressure measurements in the optimal range, and only 4 to 6 percent were definite cases of hypertension. There was no significant difference in blood pressure measurements between genders, but systolic and diastolic blood pressure (BP) both increased significantly with age ($p < 0.0001$). It is a remarkable "good news paradox" that although the Mand population is seriously obese and prone to diabetes, it has low levels of hypertension.

Awareness of and exposure to project activities and materials

The evaluation showed that there was high awareness of and exposure[26] to project activities and materials (Table 12.10). Of those interviewed, 93 percent knew about the Mand Community Working Group meetings, and 60 percent were directly involved in activities. Similarly, 90 percent were aware of the charcoal oven project, and 50 percent were directly involved. More than 70 percent of respondents indicated that they were aware of the youth work, the home gardening and cooking training, the distribution of planting materials, the planting/weight loss competitions, and the Breastfeeding Club. More than 50 percent knew about the pot luck dinner at the United States Ambassador's residence, although this single evening event involved only 15 Mand community members.

Of the awareness-raising materials used in the intervention, the Go Local billboard on the main road to Kolonia and the Pohnpei bananas poster displayed in the community meeting hall were the most well-known, by 96 and 95 percent, respectively. The indigenous foods poster was the least known, as it was introduced late in the intervention.

Results of state- and national-level activities

Similar to the project's impact at the community level, there were many indications of changes in attitude towards local foods at the state and national levels.

[26] Exposure was defined as involvement in a project activity.

Availability of *Karat* and *Daiwang* bananas in markets. Observations indicated that the market availability of *Karat* has been steadily improving since 2006. *Daiwang*, a low-status but tasty banana, was previously described as "the banana that was fed only to pigs" and was not marketed. When analysis showed that it is rich in carotenoids, it started to be promoted as a food for humans, and in 2006 it was sold at four of 14 local markets.

Increase in stalls selling local staple food take-outs. A remarkable increase in local staple food take-outs started in 2005, and has continued. Naik (2008) reports that in July 2007, more than 3 550 kg of cooked local staple foods were sold by a sample of Kolonia markets and shops. These included 1 752 kg of banana, 893 kg of breadfruit and the remainder as taro, yam and cassava. New take-out stands continued to appear. Many people, including market owners, indicated that the Pohnpei local food promotion campaign has contributed much to this increase in the marketing of local foods.

Charcoal oven development. The local carpenter engaged to produce charcoal ovens enthusiastically reported that people were purchasing his ovens: "I sold one oven to a man from Chuuk, where there is a problem with electricity outages. He was so happy and took it with him on the plane. A lady from the Marshall Islands also bought one. I built one for my family. I can bake anything in it, just like a normal electric or gas oven. We save money with it. We don't have to buy fuel."

Interest from other communities. Groups from Madolenihmw, Kitti and FSM's other states asked to replicate the project in their communities. In November 2009, the Go Local Agroforestry and Health Improvements project was initiated in six additional communities in Pohnpei and in communities in other states. Baseline surveys have been conducted and intervention activities started, including encouraging the establishment of local food policies.

Other communities that have initiated noteworthy Go Local activities include the following:

- Saladak and Rohi communities of U Municipality and Sapwohn community of Sokehs Municipality held meetings on local food promotion and hosted several large gatherings that served only local foods.
- Salapwuk community of Kitti Municipality held a workshop on building energy-efficient charcoal ovens and improving local food production skills.
- In Madolenihmw Municipality, through the leadership of Chief Lepen Madau en Metipw, the Metipw community promoted local foods at funerals and traditional gatherings. This included providing food take-outs for up to 1 000 people, using local materials such as banana leaves for wrapping and woven coconut leaves for serving foods, and avoiding plastic containers, which cause environmental problems. This community's activities to increase the use of local resources encouraged neighbouring communities to do the same.

Among the many agencies and events to use the "Go Local" slogan as a theme are Annual Library Week in 2006, COM-FSM's graduation ceremony in May 2006,[27] COM-FSM's 2008 Annual Health Fair[28] and the Pingelap People Organization's Pingelap Green Day in 2008. A youth club in Madolehnihmw Municipality took the name "Go Local", and two local softball teams wore Let's Go Local t-shirts as part of their uniform. The slogan was also used at workshops in Yap, Kosrae and Chuuk States.

Following Mand community's banning of soft drinks from all community functions in 2010, other community organizations, such as Pingelap Peoples' Organization, Inc., have done the same, as publicized in the local newspaper, on the radio and in the Go Local e-mail network.

Many people from all four FSM states have shown great interest in the e-mail network (Englberger *et al.*, 2010c). Comments from members include the following:

> I look forward to those e-mails … I print them out and share them with others too.

[27] Instead of the usual hamburgers and soft drinks, the refreshments served were fish sandwiches and drinking coconuts.
[28] A speaker at this event, speaking about the Mand case study, stated "We are all proud of this project."

> Because of this campaign, I stopped eating rice and now after about two years my son joined me. I have stopped eating rice and I also discourage my two teenage daughters from eating rice and encourage more local foods. Now my two daughters are complaining of no local foods at home.
>
> When my patients have diabetes, I tell them "go local"… I don't really know nutrition that much so I like this way of talking about taro and local food.

Newspapers have published individuals' comments indicating their appreciation of the Mand project and their interest in the promotion of local foods. The local radio broadcaster reported that following the project's press release, more than ten people had called for more information about local foods.

Results of regional- and international-level activities

The "Go Local" slogan was adopted in the title of an SPC Plant Genetic Resources documentary, and a keynote speaker at one international meeting stated that the Pohnpei Let's Go Local project should be considered a model for promoting local foods (SPC, 2007).

Women's groups in Papua New Guinea have adopted the "Let's Go Local" slogan and song (Anzu, 2008), and the International Centre for Underutilized Crops (ICUC) included a description of the Mand project in its annual symposium report for 2006. In 2008, *Kemelis* – a Pingelapese recipe documented in the Mand project – was selected as the April Recipe of the Month on the ICUC Web site.

In 2009, FAO asked IFCP to assist in developing a booklet on how to carry out a Let's Go Local campaign, and in April 2010, supported by WHO, Ms Englberger was invited to be one of only a few speakers at the Pacific Food Summit in Port Vila, Vanuatu, presenting on Go Local to enhance food security. Other publications include articles on the Pohnpei banana stamp series (Ormerod, 2006) and two chapters on local island food in a Pohnpei ethnobotany book (Balick, 2009).

Lessons learned

An overall lesson learned was that reviving memories and restoring confidence in local foods is important, and touches people's hearts and minds. Participants became more interested in health messages when they learned about their own health problems. The slogans and songs helped greatly in passing on messages, and repetition of the same message in different activities and materials was effective. The project team found that elderly people often had set habits that were hard to change, so it was important to work with youth. A realistic approach was needed, encouraging gradual changes and "practising what you preach" rather than banning imported foods. Project facilitators found that they needed to use humour in their presentations and to make activities fun. Writing and communicating about the project regionally and internationally helped spread the message and resulted in increased local interest.

Two comments from Pohnpei market owners, reported by Naik (2008), provide insight: "Today I think that the education about local food is working ... The older generation is going back to eating local and this is influencing the younger people"; and "I have been selling more local food, especially breadfruit, taro and yam, but it is still not common for the Pohnpeians to eat them everyday – they eat rice all the time everyday". Nevertheless, the impressive number of new local food take-outs is promising.

Another factor relevant to the Go Local campaign in Pohnpei is the rise in global food prices. In 2008, this became a major topic throughout the Pacific Islands (Singh, 2008), and the price of rice in Pohnpei has doubled. This could provide a stimulus for growing and consuming more local traditional food. Some have suggested producing rice on Pohnpei, which has been shown to be possible, but past attempts to do this have failed owing to the intensive nature of rice growing, which contrasts with traditional Pohnpei agroforestry. Other barriers have been the need for imported fertilizer and pesticides, and the crop's vulnerability to heavy rains and winds. In addition, processed white rice is known to be nutritionally poor, and high consumption of rice presents health risks.

The inclusion of Pohnpei as a case study in this global project provided a rewarding experience for the project team and participants as they progress towards the goal they share with the other 11 communities in the CINE Food Systems for Health Program.

Conclusions

The health situation in FSM continues to be considered a "state of health emergency", as more and more individuals become ill with non-communicable diseases, including diabetes, heart disease, stroke and cancer (FSM Information Services, 2010). Project activities have been popular and have succeeded in increasing people's awareness of this health crisis, and improving their use of better food, their food diversity and their nutrition. With time, this dietary change seems likely to improve the health of all the people in Pohnpei.

The project found many activities that contribute to healthy diets, and an approach that works. In the past, diets and lifestyles changed towards the use of imported food, but they can also shift back to more local foods, and are already doing so.

The way forward

New goals for the projects are:

- advocacy with Pohnpei leaders (traditional, government, church, and private sector) to promote local food and relevant policies;
- expansion of the project to other communities in Pohnpei and other FSM states;
- expansion to more local, regional and international partners, focusing on local foods and their CHEEF benefits;
- continued development of awareness materials and methods for increasing the production and consumption of local foods and varieties;
- a continuous watch for signs of improved health status that can be attributed to the project.

As one team member pointed out: "Remember that this is a long-term process, we may not see the full change in our lifetime, but it is happening." Another team member pointed out: "It is hard to change but let's hang in there, don't give up!"

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