

# An Evaluation of a Nutrition Intervention in Kapinga Village on Pohnpei, Federated States of Micronesia

*Michelle Hanson\**, MPH candidate.: email: Michell7@email.arizona.edu, tel 480-244-1776, University of Arizona, Tucson, AZ

*Lois Englberger*, Ph.D.: email: nutrition@mail.fm; Island Food Community of Pohnpei, P.O. Box 1995, Kolonia, Pohnpei 96941 FM

*Burriss Duncan*, MD.: email: brduncan@email.arizona.edu, tel 520-907-7865, University of Arizona, Tucson, AZ

*Douglas Taren*, Ph.D.: email: taren@email.arizona.edu, tel 520-626-8375, University of Arizona, Tucson, AZ

*Henrich Mateak*, Kapinga Village Community, Kolonia, Pohnpei, P.O. Box 1995, Kolonia, Pohnpei 96941 FM

*Emihner Johnson*, email: emilojo@yahoo.com; Island Food Community of Pohnpei, P.O. Box 1995, Kolonia, Pohnpei 96941 FM

\*corresponding author.

## Abstract:

The people of Kapinga Village are suffering from chronic diseases as a result of their lifestyles and eating habits, similar to many Pohnpeians. Kapinga Village is an urban area on the island of Pohnpei, Federated States of Micronesia, settled by people from Kapingamarangi, a remote atoll. The villagers have limited access to traditional staple foods, including breadfruit, banana, and taro, fruits, vegetables, and other healthy foods. The Island Food Community of Pohnpei (IFCP) carried out several nutrition interventions in Kapinga Village to prevent disease, including promotion of physical activity through growing local food, a nutritious diet of local foods, cooking classes, container gardening, and charcoal oven workshops. This study evaluated the effect of those interventions on dietary intake. A 7-day Food Frequency Questionnaire (FFQ) was administered in June-July, 2010 to participants from 68 households and data were compared to 2009 baseline data. Qualitative data were collected and analyzed to identify salient themes that were associated with changes in dietary intake. The FFQ data indicated that there was an increase in consumption of local fruits and vegetables compared with the baseline. Qualitative data revealed that participants viewed the interventions positively. The data also revealed that some of the new foods and drinks consumed were those already available in the village, but for which their uses had not previously been known (such as banana flower and hibiscus tea). Such improvements are likely to be sustainable. Recommendations are for more education, in the Kapingan language if possible, and future research to determine what culturally appropriate interventions are still needed to improve nutrition in Kapinga Village.

## Introduction

The people in Kapinga Village, located in the main town of Kolonia, of Pohnpei State, Federated States of Micronesia (FSM), have experienced a great change in diet and lifestyle in recent years. This has resulted in high rates of overweight and obesity and disease outbreaks, including non-communicable diseases, such as diabetes.<sup>1</sup> In 1948, no diabetes was documented in Pohnpei.<sup>2</sup> By 2002, 32% of adult Pohnpeians had type 2 diabetes.<sup>2</sup> This change corresponds to a change in dietary habits. The traditional diet consisted



of unprocessed foods low in fat and rich in nutrients, fiber, and beta-carotene whereas the current diet consists of large amounts of imported white rice and other processed foods high in fat, salt, and sugar.

The Island Food Community of Pohnpei (IFCP), chartered in 2004 as a non-governmental organization (NGO) uses an inter-agency, research based, community approach and various interventions to help promote production and consumption of local foods. Their slogan, "Let's Go Local," encourages people to return to a more traditional diet that includes taro, banana, breadfruit, pandanus, and other foods rich in beta-carotene and other carotenoids. Beta-carotene is a provitamin A carotenoid and is converted into vitamin A in the body, and helps to prevent vitamin A deficiency as well as anemia.<sup>3</sup> The rich content of total carotenoids in local foods helps protect against some cancers<sup>4</sup>, as well as other non-communicable diseases, including diabetes<sup>5</sup> and heart disease.<sup>6</sup> Eating more local low-fat and non-processed local foods will hopefully help to reduce consumption of unhealthy imported processed foods. The IFCP emphasizes the 'CHEEF' (Culture, Health, Environment, Economy, Food Security) benefits of local food through social marketing, research, increasing public awareness through trainings, promoting production and preservation of local foods, and conservation of rare varieties of local crops.<sup>7</sup>



The residents of Kapinga Village come mainly from an outlying atoll, called Kapingamarangi. The atoll lies 740 Km to the west of Pohnpei and is reached only by occasional sea-faring boats. Due to harsh conditions on their own island, many residents of Kapingamarangi migrated to Pohnpei. Though permanent relocation to Pohnpei was not the intent, the immigrants were given a long term lease to Kapinga Village, and there they still reside.<sup>10</sup> Around 800-1000 people currently live in Kapinga Village, on a relatively small piece of land, roughly 1.5 to 2 square

miles (for the general population in Pohnpei the population density is 261 people per square mile.)<sup>11</sup> As a result, Kapingans have very little space for planting food crops and rely mostly on imported food. There are at least 5 people in most households, and many have 10-15 people living in a small house.<sup>8</sup> Kapingans create traditional handicrafts and carvings, sold in local markets and to tourists as their main source of income. The community is isolated from the rest of Pohnpei as they speak their own language (Kapingan) and have had some difficulties integrating into the Pohnpeian community.

A social safety net study<sup>8</sup> took place in January-February 2009 coordinated by the IFCP in three communities on Pohnpei; Kapinga Village, Mand (a community of people from a neighboring atoll) and Salapwuk (the most remote community in Pohnpei). Of Kapingans surveyed, 43% had 0 fruit in 7 days, while 19% in Mand and 14% in Salapwuk had 0 fruit in 7 days<sup>8</sup>. This indicated that there were more serious problems in the Kapingan diet which needed to be addressed.

A collaborative study done by IFCP in June-July 2009 reported a lower intake of fruits and vegetables in



Kapinga Village, Pohnpei, compared to the island of Pohnpei.<sup>9</sup> Also, only 4% of households interviewed were considered food secure.<sup>9</sup> Therefore, the community, Kapinga Village, was chosen as an intervention site because it was close with easy access, had a high population of disadvantaged people with limited education, and several partners of IFCP, including the College of Micronesia-FSM Cooperative Extension Services had expressed an interest in working with this community.

## Methods

### Intervention

On July 31, 2009, approximately 40 residents of Kapinga village attended a container gardening workshop led by the IFCP and College of Micronesia-FSM Cooperative Extension Services. Container gardening involves planting in any type of available container, including spare tires, buckets, and burlap sacks. The workshop covered proper soil composition as well as procedures for caring for and growing seedlings. Participants were provided cucumber, eggplant, Chinese cabbage, and bell pepper seeds, and papaya plants. IFCP staff monitored the progress of plant growth and provided technical advice over a period of three months.



A two day charcoal oven workshop, coordinated by the IFCP and College of Micronesia-FSM Cooperative Extension Services was held in June of 2009. The training focused on how to build and use a charcoal oven. "The advantages of the charcoal oven are that it provides a healthy way of cooking, is cost-saving and environmentally friendly (it releases less carbon emissions into the environment, compared to open fire cooking), and it is more convenient than a traditional earth oven"<sup>12</sup> Disadvantages of a charcoal oven may be the cost of

buying one (although one villager built his own with parts from the dump) and the time needed for heating the charcoal (although the cooking time in a charcoal oven is similar to that of an electric or gas oven).

Over 30 people attended a cooking and charcoal oven workshop which began on January 22, 2010, held in Kapinga Village. The workshop was coordinated by the IFCP as well as the College of Micronesia-FSM Cooperative Extension Services Expanded Food and Nutrition Education Program, and lasted for one week. The purpose of the workshop was to promote planting and eating of local foods and encouraging more physical activity to help prevent diabetes, heart diseases, cancer, and other chronic diseases. Ten recipes were demonstrated.



## Evaluation Study Design

An evaluation study was conducted to determine if food intake patterns had changed as a result of the interventions that took place in Kapinga Village in 2009-2010. The study design used a “mixed method” strategy, combining quantitative and qualitative approaches. The quantitative approach utilized a seven-day Food Frequency Questionnaire (FFQ) to evaluate food intake patterns. Dietary data were collected using 7-day FFQs in June-July 2010, comparing to baseline data collected in June-July, 2009.<sup>7</sup> Households in 2009 were sampled randomly from a list of the village households and sampling for households in 2010 was purposive, including some other households who joined a group meeting designed both for awareness raising and data collection. Dietary assessment and interviews were conducted first during the group meeting and then house to house. Inclusion criteria were that only one member of a household could complete the survey and they had to have been a part of one or more of the intervention workshops.



The FFQ as well as interview questions were conducted face to face by the lead researcher and additional trained interviewers. The interviewers were fluent in Pohnpeian, English, and Kapingan. The FFQ consisted of 23 main food categories, each of which had additional selections added below. The FFQ was based on the Helen Keller International 7-day FFQ<sup>13</sup> but modified for use in the FSM<sup>14</sup> and later further modified for use on Pohnpei.<sup>8,15,16</sup> Foods were chosen by local staff based on what was normally

available in markets, stores and gardens. For each food listed in each category, participants were asked, “How many days in the last seven have you eaten [name of food item]...?” The food categories included local starch, imported starch, local fruit, imported fruit, local vegetables, imported vegetables. For the full list, see tables 1 and 2. Six pilot pre-tests were conducted to test for understand ability.

The qualitative approach in the study involved ethnography, using in-depth interviews and observations aimed at understanding awareness and attitudes toward the intervention and dietary habits. The interview questions included those in tables 3 and 4 which asked questions about how the participants felt about the workshops. Questions were also asked about use and knowledge of the charcoal oven, if what they believe affects their health, and if they would like further workshops.

Fifty three households (one person per household) were located for the in depth interviews. Interviews were conducted by trained interviewers and by the lead researcher.



## Data Analysis

In 2010, 68 households were surveyed and data were compared to that of 75 households surveyed in 2009 (some households surveyed in 2009 could not be located in 2010). FFQ data was entered into Microsoft Excel (version 7) and then into STATA statistical software. Means of the number of days foods were consumed were compared to those of 2009, using a t-test to compare data, and a significance level of P0.05.

Qualitative data were recorded into field notes and analyzed by placing into themes. Throughout the study the ethnographic approach was appropriate in gaining insight (the insider's view) to awareness and attitudes toward the interventions and dietary habits.

## Study Population

The sample included 18 men and 50 women, ages 21-70. One member of each household was interviewed. The mean age of the population sampled was 53. Only 8 people were under the age of 35. Further demographic data was not obtained in 2010 because it was considered culturally inappropriate to ask about education and income. Informed consent was obtained verbally from each respondent.

## Results



Significant findings were that local fruits consumed increased from 2009 to 2010, from 1.2 to 2.9 ( $p < 0.001$ ) mean days per week, local vegetables consumed increased from 2.8 to 4.6 ( $p < 0.001$ ), and imported vegetables increased from 0.7 to 2.0 ( $p < 0.001$ ) (table 1). Local fish and seafood consumption increased from 2.5 to 4.4 ( $p < 0.001$ ) mean days per week.



**Table 1: Comparison of mean frequency of consumption of selected foods in Kapinga Village, Pohnpei, captured by 7-day food frequency questionnaires 2009 vs in 2010**

Food Item	2009 Mean Days per Week ( $\pm$ sd) (n=75)	2010 Mean Days per Week ( $\pm$ sd) (n=68)	p-value
<b>Staples</b>			
Local Starch Food <sup>1</sup>	3.4 $\pm$ 2.3	3.9 $\pm$ 2	0.17
Rice	5.7 $\pm$ 2	5.8 $\pm$ 1.9	0.76
Flour Products <sup>2</sup>	4.6 $\pm$ 2.5	5.3 $\pm$ 2	0.06
<b>Fruits and Vegetables</b>			
Local vegetables <sup>3</sup>	1.2 $\pm$ 1.6	2.9 $\pm$ 2.5	<0.001
Local fruits <sup>4</sup>	2.8 $\pm$ 2.2	4.6 $\pm$ 2	<0.001
Imported fruits <sup>5</sup>	0.5 $\pm$ 1.2	1.5 $\pm$ 2.3	0.002
Imported vegetables <sup>6</sup>	0.7 $\pm$ 1.5	2.0 $\pm$ 2.2	<0.001
<b>Protein</b>			
Local fish and seafood	2.5 $\pm$ 2.6	4.4 $\pm$ 2.2	<0.001
Local meat	0.3 $\pm$ 0.8	0.88 $\pm$ 1.5	0.004
Imported meat	1.1 $\pm$ 1.7	1.7 $\pm$ 1.7	0.03
Eggs	1.1 $\pm$ 1.9	1.5 $\pm$ 1.9	0.21
Imported fish and seafood	3.1 $\pm$ 2.4	3.0 $\pm$ 2	0.79
<b>High Fat Foods</b>			
Turkey tail	0.8 $\pm$ 1.2	0.79 $\pm$ 1.2	1
Fried foods	2.5 $\pm$ 2.2	2.6 $\pm$ 2.3	0.79
<b>Beverages and Snacks</b>			
Imported drinks with sugar	3.9 $\pm$ 2.8	5.0 $\pm$ 2.3	0.011
Imported sugar foods	1.2 $\pm$ 2.1	1.9 $\pm$ 2	0.04
Imported salty foods	0.7 $\pm$ 1.3	1.0 $\pm$ 1.8	0.25
Local snack food <sup>6</sup>	0.5 $\pm$ 1.1	0.44 $\pm$ 1	0.57

2009 data from (Del Guercio, 2010). Data from both years 2009 and 2010 were collected in June-July.

\*n=75 households in 2009 and 68 in 2010, one person per household. sd=standard deviation.

Both males and females participated. In 2010, ages of participants were between 21 and 77. There were 18 male and 50 female participants. In 2009, ages of participants were between 20 and 79. There were 53 males and 22 females.

All participants were asked how many days in the previous seven days had they consumed the selected food items.

<sup>1</sup>Includes breadfruit, green banana, giant swamp taro, taro, cassava, yam.

<sup>2</sup>Includes bread, ramen, doughnut, pancake, noodle, spaghetti, pie, cake, ship biscuit, cracker, cookie.

<sup>3</sup>Includes banana flower, chaya, puke, spinach, chili leaf, kangkong, basil, beans, eggplant, cabbage, bell pepper.

<sup>4</sup>Includes banana, mango, local apple, watermelon, citrus (calamansi, tangerine), pineapple, guava, papaya, pandanus.

<sup>5</sup>Includes apple, orange, grapes, canned fruit or juice.

<sup>6</sup>Includes sugar cane and adohl coconut husk.



**Table 2: Consumption of selected foods in Kapinga Village, Pohnpei captured by 7-day food frequency questionnaires in 2010, n=68**

Food Item	Frequency of Consumption				Mean days consumed (± sd)
	Never (0 Days) n (%)	Sometimes (1-3 days) n (%)	Often (4-6 days) n (%)	Daily (7 days) n (%)	
<b>Staples</b>					
Local Starch Food	1 (2)	36 (53)	17 (25)	14 (21)	3.9 ± 2
Rice	1 (2)	12 (18)	10 (15)	44 (65)	5.8 ± 1.9
Flour Products	0 (0)	15 (22)	21 (31)	31 (46)	5.3 ± 2
<b>Fruits and Vegetables</b>					
Local vegetables	13 (19)	33 (49)	6 (9)	15 (22)	2.9 ± 2.5
Imported vegetables	26 (38)	28 (41)	8 (12)	6 (9)	2.0 ± 2.2
Local fruit	1 (2)	23 (34)	21 (31)	22 (32)	4.6 ± 2
Imported fruit	41 (60)	14 (21)	6 (9)	7 (10)	1.5 ± 2.3
<b>Protein</b>					
Eggs	33 (49)	24 (35)	9 (13)	2 (3)	1.5 ± 1.9
Local fish and seafood	2 (3)	24 (35)	21 (31)	21 (31)	4.4 ± 2.2
Imported fish and seafood	7 (10)	35 (51)	18 (26)	8 (12)	3.0 ± 2
Local meat	43 (63)	22 (32)	2 (3)	1 (2)	0.88 ± 1.5
Imported meat	24 (35)	31 (46)	12 (18)	1 (2)	1.7 ± 1.7
<b>High fat foods</b>					
Fried foods	19 (28)	23 (34)	20 (29)	6 (9)	2.6 ± 2.3
Turkey tail	40 (59)	27 (40)	0 (0)	1 (2)	.79 ± 1.2
<b>Beverages and Snacks</b>					
Imported drinks with sugar	4 (6)	15 (22)	14 (21)	35 (51)	5.0 ± 2.3
Local snack food	54 (79)	12 (18)	2 (3)	0 (0)	0.44 ± 1
Imported sugar food	22 (32)	35 (51)	6 (9)	5 (7)	1.9 ± 2
Imported salty food	43 (63)	19 (28)	3 (4)	3 (4)	1.8

Notes: Number and percentages of participants. Unless otherwise indicated, : sd=standard deviation. n=68 households, one person per household. Both male and female participants were between the ages of 21 and 77. All participants were asked how many days in the previous 7 days had they consumed the selected food items. Descriptions of food items of various categories are described further in Table 1 footnote.

The FFQ showed that rice (5.8 days per week) was the most commonly consumed item, followed by mango, breadfruit, ramen (packaged noodles), and fish (table 2). Ninety nine percent of the population ate rice at least once a week. Sixty eight percent of the population ate bread at least once a week, and 71% ate ramen at least once a week. Ramen and rice are both commonly eaten for breakfast as well as for other meals. Uncooked ramen with Kool Aid is a common snack for youth. Part of the IFCP goal was to encourage people



to replace at least half of the ramen or rice on their plate with local foods.

A large percent of the population ate local foods as well: At least once a week 81% of the households ate breadfruit (the survey took place during the breadfruit season), 68% of the households ate banana, 57% of the households ate giant swamp taro, 57% of the households ate chaya (a green leafy vegetable), and 98% of the households ate mango. Because the FFQ completed in 2009 did not include this type of data, it was not possible to compare their consumption with the previous year.

Another significant finding was that local fish are consumed in high amounts (reef fish 62% and tuna, 72%). However imported (canned) fish are also bought and eaten quite often (mackerel, 75% and tuna, 57%).

The mean days of foods consumed for those over 35 were compared with those under 35, and differences in eating patterns were minimal.

**Table 3: Responses to the question, “What did you think of the container gardening workshop?” administered to Kapinga Village, Pohnpei study participants in 2010 n=33 households**

Topic of Evaluation	Was the container gardening workshop useful to the people of Kapinga Village, Pohnpei in their opinion?			
Question Asked	What did you think of the container gardening workshop?			
Themes	Learning	Challenges	Health	Economy
Sample responses	I learned a lot from this workshop. Now I know how to plant them. I liked it (the planting). (3)  It was very good. (9)  I learned how to plant and what kind of plant is important. (2)	It’s good but I don’t have a garden.  I didn’t get any seeds.  I have no big area to plant in. (4)  It’s good but I planted mine and the rats ate them, so I stopped. (2)	It was useful. Local food is good for the body.  The things I got are good for my family to eat.  I use the garden to feed the family and it’s healthier.  I learned about a variety of food.	I learned how to plant and it stopped me from going to the store to buy flowers.  I want more seeds. If the garden is growing, I won’t spend money.  Before, I bought from the store but now I eat leaves from around my house.  It helped me to learn to plant my own plants.

\*A number after the comment indicates a multiple number of people who answered similarly.

Tables 3 and 4 present the results of the qualitative data from the 53 interviews. One member of each household was asked, “Was the container gardening workshop useful?” Table 3 is a compilation of the responses. After the data was gathered, responses were placed into one of four themes. Most people had short yet indistinct answers, such as, “it was very good.” A few people had more specific opinions, such as, “before I bought from the store but now I eat leaves from around my house.” Common responses as to





why container gardening was not successful or was not sustained were that, “rats ate the seeds,” “dogs or people stepped on the plants,” and “people did not take care of the plants.”

Table 4 addresses the questions, “In what ways were the cooking classes helpful?” Responses were again grouped into four themes. Twelve respondents claimed that they had “learned a new way to cook local foods.” Six respondents noted that they now use the banana flower that they used to throw away. Negative responses related to not having enough space to grow food for the recipes taught in the cooking class.

**Table 4: Responses to the question, “In what ways were the cooking classes helpful?” administered to Kapinga Village, Pohnpei study participants in 2010. n=44 households**

Topic of evaluation	Were the cooking classes helpful to the people of Kapinga Village, in their opinion?			
Question asked	In what ways were the cooking classes helpful?			
Theme	Learning	Health	Enjoyment	General
Sample responses	I learned a new way to cook. (3)	It helped a lot to know lots of food and nutrition. The class gave a lot of help to cook the food for my kids.	I liked the food we made.	When I was in Kapinga (their atoll island home), we ate local foods every day. We didn't know of rice and flour.
	I used to throw out the banana flower but now I know it is good, so I save it. (6)	We were taught local food is better than rice or flour.	I came home and tried the recipes on the kids and they liked them.	Before the workshop, I ate whatever I wanted, but now I've started cooking.
	I learned a lot on how to cook local food. (12)	There are many healthy foods around us but we don't know, so we learn.	I learned how to cook the foods and also the names of the local foods.	It is good for health and it decrease the money I spend.
	I try to cook the recipes. If I forget, I look at the paper they gave us.	People are using taro leaves now, and cooking with an oven.	I make the banana flower recipe a couple times a week now. (2)	I am setting an example now. Before the workshop, the hibiscus tree was just a decoration. Now I value it more.

Notes: The number of participants indicates the number of households, one person per household. A number after the response indicates a multiple number of people who answered similarly.



## Discussion

Diets in Kapinga Village have changed from 2009 to 2010. There is an increased consumption of fruits, vegetables, and seafood. Possible reasons for this are the interventions that took place through the work by the IFCP and the College of Micronesia-FSM Cooperative Extension Services. Kapingans are using the banana flower (a nutritious food) for cooking now, which they previously threw away. The banana flower is harvested from already available banana plants. Hibiscus flower drink is also becoming popular in the village, and was not previously known. These flowers can also be harvested from already available plants. Kapingans are eating more fish and less fatty corned beef and chicken. Community members are starting to take more responsibility for their health as well. In July, 2009 only water was served at a community function, whereas previously soft drinks would have been served.

Responses to questions regarding opinions of Kapinga Village participants about the usefulness of the workshops were mostly positive. Although the container gardening workshop demonstrated a possible solution, it did not prove sustainable. It may be useful to focus on more familiar and less sensitive traditional crops already planted in the village, such as banana, and on increasing plant productivity by use of composting, trimming, and other good management practices, or to re-introduce container gardening with more education and supervision.

Similar interventions consisting of cooking classes, and nutrition and physical activity education have taken place in other locations with similar results. In Hawaii, the Healthy Hawaii Initiative took place from 2000-2004. Short term indicators indicated an increase in consumption of fruits and vegetables.<sup>18</sup>

A study by Satterfield et al comparing methods of intervention to prevent type 2 diabetes indicated that the community based approach like the one used on Pohnpei has a potential to benefit the larger population and relies on community strengths such as cultural practices and knowledge, with community participation.<sup>19</sup> She mentions that cultural relevance of interventions is important.<sup>19</sup> The study noted that positive results were seen using community education in native populations in America (Akimel O'odham), New Zealand, and Australia.<sup>19</sup> Specific intake of fruits and vegetables were not noted, but knowledge and exercise were increased.<sup>19</sup>

Some of the data found in 2010 could not be compared to data from 2009 due to differences in what was collected. The data collected in 2010 will serve as baseline data for future evaluations.

It is likely that people consume high amounts of canned fish because few people have access to a boat, fishing line, and storage facilities (fresh fish cannot be stored for long without a refrigerator); thus canned fish is convenient and suited to the present situation.

## Conclusions and Recommendations

The results of the FFQ show that there was an increase in consumption of fruits and vegetables, as well as local fish, from 2009 to 2010. This is a positive outcome, and suggests that the intervention carried out in Kapinga Village from August 2009 to June 2010 resulted in an increased use of healthy local food. More research should be done on how to increase access to healthy foods for the people of Kapinga Village.



Continued interventions are also needed to increase the consumption of local staple foods, fruits and vegetables, and decrease the consumption of rice, ramen, and fried foods, using culturally appropriate methods including use of Kapingan language when possible. Cooking classes may have more impact by focusing on recipes that can be prepared without food purchase.

## Acknowledgements

Thanks are extended to Pacific CEED and US Forestry for funding and other support, and to College of Micronesia (COM FSM), FSM Department of Health and Social Affairs. Warm thanks also to Kim Del Guercio for the use of her data.

## References

1. Hezel FX. 2010. Disease in Micronesia: A historical survey. *Pacific Health Dialogue*, 16 (1): 11-25.
2. World Health Organization (WHO) 2008. Federated States of Micronesia (Pohnpei) NCD risk factors STEP report, Suva, WHO Western Pacific Region.
3. McLaren D.S., Frigg M. 2001 *Sight and Life Manual on Vitamin A Deficiency Disorders (VADD)* 2nd ed., Basel, Task Force Sight and Life
4. World Cancer Research Fund (WCRF)/American Institute for Cancer Research (AICR) 2007 *Food, Nutrition, Physical Activity and the Prevention of Cancer: A Global Perspective*. AICR, Washington, DC
5. Coyne T, Ibiebele T.I., Baade P.D. Dobson A, McClintock C, Dunn S., Leonard D, and Shaw J. 2005 Diabetes mellitus and serum carotenoids: findings of a population-based study in Queensland, Australia. *American Journal of Clinical Nutrition* 82: 685-693.
6. Kritchevsky SB. 1999. Beta-carotene, carotenoids and the prevention of coronary heart disease. *Journal of Nutrition*. 129:5-8 [review].
7. Englberger L, Joakim A, Larsen K, Lorens A, Yamada L. 2010. Go Local in Micronesia: Promoting the 'CHEEF' Benefits of Local Foods. *Sight and Life Magazine*. (1): 40-44.
8. Englberger L. 2009. Report on the Impact of Rising Food and Fuel Prices Study in Three Selected Pacific Island Countries: Pohnpei, Chuuk, Yap and Kosrae, Federated States of Micronesia; Republic of Kiribati; Republic of Marshall Islands. An AusAID/ADB Initiative and NZAID and UNICEF Partnership as part of an Asian Development Bank (ADB) social safety net study.
9. Del Guercio K. 2010. Assessment of Household Food Security in a Polynesian Community Living in Pohnpei, Micronesia. *International Health*. Atlanta, GA. Rollins School of Public Health., Emory University, Master of Public Health.
10. Lieber M.D. 1968. Porakiet: a Kapingamarengi colony on Ponape. Department of Anthropology. Eugene, OR, University of Oregon.
11. Statistical Yearbook Federated States of Micronesia July 2007. Department of Economic Affairs.
12. Yamada L. Kapinga Village cooks fish and chaya recipe in a charcoal oven. Kaselehlie Press. February 3-16, 2010. P.15.
13. Eigbefoh JO, Okpere EE, Ande B, Asonye C. 2005. How useful is the Helen Keller food frequency chart in the determination of vitamin A status in pregnancy? *Journal of Obstetrics and Gynecology* 25 (2): 123-127.
14. Englberger L, Aalbersberg W, Ravi P, Bonnin E, Marks GC, Fitzgerald MH, Elymore J. 2003. Further



- Analyses on Micronesian Banana, Taro, Breadfruit, and Other Foods For Provitamin A Carotenoids and Minerals. *Journal of Food Composition and Analysis*, 16: 219-236.
15. Corsi A, Englberger L, Flores R, Lorens A, Fitzgerald MH. 2008. A participatory assessment of dietary patterns and food behavior in Pohnpei, Federated States of Micronesia. *Asia Pacific Journal of Clinical Nutrition* 17(2): 309-316.
  16. Kaufer L, Engleberger L, Cue R, Lorens A, Albert K, Pedrus P, Kuhnlein HV, 2010. Evaluation of a traditional food for health intervention in Pohnpei, Federated States of Micronesia. *Pacific Health Dialogue* 16(1): 61-73.
  17. Dignan C, Burlingame B, Kumar S, Aalbersberg W. 2004. *The Pacific Islands Food Composition Tables. Second Edition.* Food and Agriculture Organization of the United Nations. Rome.
  18. Maddock J, Takeuchi L, Nett B, Tanaka C, Irvin L, Matsuoka C, Wood B. 2006. Evaluation of a state wide program to reduce chronic disease: The Healthy Hawaii Initiative, 2000-2004. *Evaluation and Program Planning* 29(3): 293-300.
  19. Satterfield D, Volansky M, Caspersen C, Engelgau M, Bowman B, Gregg W, Geiss L, Hosey G, May J, and Vinicor F. 2003. Community-based lifestyle interventions to prevent type 2 diabetes. *Diabetes Care* 26(9): 2643-2652.

*“When I was a boy of 14, my father was so ignorant I could hardly stand to have the old man around. But when I got to be 21, I was astonished by how much the old man had learned in 7 years.”*

*Mark Twain*

