NUTRITIONAL ASSESSMENT AMONG THE NEGRITO FAMILIES IN CANGGUHUB, MABINAY AND CEBUANO FAMILIES AROUND LAKE BALINSASAYAO

C. B. Fontelo and L. V. Lim

Introduction

If health improvement of the inhabitants is an important aspect of economic development in a community, then food, which is a determinant of health, must be given attention. To a very significant extent, nutrition determines what ultimately becomes of man. Nutrition is perhaps the single most important factor which influence the development of people. Studies show the important role that nutrition plays in shaping our physique, molding our mind, and even influencing our feelings and behavior (Florencio, 1986).

While the need for food is instinctive, man is not equipped with the same natural instinct to know and to determine what and how much food is necessary for him to eat in order to attain optimum health. This is something that is acquired or learned. People in many societies have their own way of determining what is food and what is not food and what kind of food should be eaten and on what occasion. This gives rise to food habits and practices which distinctly differentiate one group of people from another.

This particular study aims to establish and understand the nutritional status of two groups of people living in two separate areas where development project is in progress.

The two groups of people in this study belong to different cultural background and live in different natural ecosystems. These variables influence to a great extent the kind and amount of available food resources, their food consumption practices, and consequently, their state of nutrition.

Cangguhub is approximately 300 meters above sea level and is situated in the municipality of Mabinay around 87 kilometers northwest of Dumaguete City. Farmers depend on rain water to grow their plants. During the dry months, very few plants could grow hence harvest is marginal or none at all. This place is in-

habited by the Ata, many of whom married Cebuano lowlanders. They have begun to produce their own food, a development from their being natural gatherers and hunters. Farming is characterized by promoting food crops primarily for household consumption. Many of them work as paid laborers of landowners nearby. Wage labor has become a major source of cash income for the Ata.

Lake Balinsasayao area is a typical rainforest situated between 800 to 1,000 meters above sea level approximately 25 kilometers northwest of Dumaguete City. It is occupied by lowland Cebuano migrants. Its climate and soil condition are condusive to the growth of a variety of trees and food crops. Farmers in this area plant food and cash crops. While the place has produced marketable products, transporting its produce to nearby towns for marketing has been a perennial problem.

The main objectives of this study are:

1. To determine the dietary adequacy of the families in Lake Balinsasayao and in Cangguhub and identify any deficiency in specific nutrient intake;
2. To find out existing food preparation and consumption practices of the families and utilize the information to serve as a starting point for nutrition education and food precessing lessons.
3. To assess the food situation in the two areas;
4. To assess the nutritional status of pre-school children by anthropometric measurements.

Methodology

Four families from the Lake Balinsasayao area and twelve milies from the Ata settlement area in Cangguhub, were the bjects of this study. Information regarding usual food intake, od preparation and consumption practices, and food availability ere obtained by interviewing either the father or the mother each household.

Intake of calories, protein and seven other essential nuients based on the typical food intake was calculated by the use the Food Composition Table (1980) published by the Food and

Nutrition Research Institute (FNRI). The average per person nutrient intake of the family was compared with the per person recommended allowance by the FNRI.

Twenty-one preschoolers in Cangguhub and 35 preschoolers in Balinsasayao were weighed using a bathroom scale. The actual weights of the children were compared with the recommended weight standard for Filipino children using the following formula:

$$\frac{\text{Actual weight}}{\text{Standard weight}} \times 100 = \text{Percent of standard weight}$$

The children were then classified according to the degree of malnutrition using the Gomez standard:

91% and above	— Normal
76-90%	— First Degree Malnourished
61-75%	— Second Degree Malnourished
60% and below	— Third Degree Malnourished

The height of the preschoolers was measured in centimeters by means of a tape measure fixed to a wall. The children were classified according to height using the standard height for given age set by Jayme et. al.

Hemoglobin test was done among the women or child-bearing age using the Sahli method. The result was again compared with a standard blood hemoglobin level.

General Nutritional Condition

The results of the dietary surveys in Cangguhub and Lake Balinsasayao are presented separately.

Cangguhub

Meal Pattern. The usual meal pattern of the Ata families in Cangguhub, Mabinay is as follows:

Breakfast

Boiled root crops (Cassava, *Bisol, Gabi* or *Camote*)

Lunch and Supper

Boiled green leafy vegetables (usually, *Bago leaves*)
Boiled corn or root crops (Cassava, *Bisol, Gabi* or *Camote*)

Breakfast of the Ata consisted of boiled root crops, mainly, cassava. Others mentioned taking *bisol, gabi* and *camote.*

Lunch and supper consisted of corn or root crops and boiled green, leafy vegetable, usually *bago* leaves. None of the families used fat in cooking. *Tabios* was the most commonly consumed legume; however, during the survey none of the families reported taking *tabios* or any legume since it was out of season. Six of the twelve families interviewed did not mention using vegetable for lunch or supper. Only three families had *bulad* (dried fish) in their diet.

"Tuba," an alcoholic drink made from fermented coconut sap was heavily consumed by the Negrito menfolk. It was usually taken in the afternoons and evenings.

Nutrient Intake. Table 1 shows the average nutrient intake of the Ata.

Table 1

Average Per Person Nutrient Intake In Cangguhub, Mabinay

Nutrient	Intake	Percent RDA
Calories	1,346	64
Protein (gm)	32	74
Calcium (gm)	0.313	63
Iron (mg)	6.0	59
Vitamin A (I. U.)	2,894	93
Thiamine (mg)	0.4	37
Riboflavin (m)m	0.5	46
Niacin (mg equivalent)	3.0	25
Vitamin C (mg)	103	163

Despite their high carbohydrate diet, their caloric intake was only 64% of the recommended daily allowance (RDA). The low caloric intake which is characterized by relatively high carbohydrate, low protein and low fat content is typical of a poor diet usually consumed by economically depressed households. In this area, cassava and corn constituted the great proportion of the carbohydrate.

Protein intake was 74% of RDA, 63% of which was contributed by corn. Green leafy vegetables contributed a considerable amount of protein, about 31% of the total protein intake. From the diet history taken from 12 families, only three reported taking animal protein mainly from dried fish.

In Cangguhub, where supplies of animal protein are very inadequate, increasing the production of high-protein plants such as legumes, dark green leafy vegetables and cereals is necessary. Among all plant sources, legume is the most valuable, usually containing from 20% to 25% of protein together with appreciable quantities of thiamine, riboflavin, calcium and iron. In addition, they are of great importance agriculturally owing to their nitrogen-fixing powers (Jeliffe, 1968).

Tabios (black pigeon pea) is the most commonly produced and consumed legume in Cangguhub. It contains 24.62% of protein which is comparable with other legumes planted in this area like mung beans, green and yellow varieties, which contain 22.94% and 23.31% protein, respectively. Mung bean, however, has an added advantage of containing more methionine, the limiting amino acid in legume. In addition to this, it also has more tryptophan, an essential amino acid which is a precursor of niacin. Niacin is a vitamin which is very inadequate in the diet of the Ata.

Dark green leafy vegetables are potentially extremely valuable food in Cangguhub. Like legumes, they are not only good sources of protein, but also supply other nutrients such as beta-carotene, thiamine, riboflavin, iron and Vitamin C. *Bago* leaves which are the most commonly consumed leafy vegetables contain approximately 3 gm protein per ½ cup serving portion. *Malunggay* which is known to be the most nutritious of the green leafy

vegetables was also consumed but was not widely grown in the locality. The consumption of *bago* leaves as well as the growing and consumption of *malunggay* leaves should be encouraged among the Negritos.

Cereals, like corn, have incomplete protein because they are deficient in essential amino acid lysine and tryptophan. Dark green leafy vegetable and legumes like *tabios* and mung beans which are grown in the Ata area in Cangguhub, are deficient in the essential amino acid methionine and cystine. This plant proteins when taken together could complement the essential amino acids lacking in each food. Biologic value of these plant protein is, thus, improved. This capacity of proteins to make good one another's deficiencies is known as their supplementary value (Davidson 1975).

All nutrients, except Vitamins A and C, were inadequate in the diet of the Ata. Almost all of the Vitamin A and 72.5% of the Vitamin C were contributed by the *bago* leaves.

In plants, Vitamin A comes from vegetables and fruits in the form of carotene. Carotenes like beta-carotene have yet to be converted in the intestinal wall before these can be used in the body (VADAG, 1983). Performed Vitamin A (retinol) is four to six times as deficient as beta-carotene because much of the beta-carotene is lost in the process of converting it to usable form. In addition, since carotene and Vitamin A are fat-soluble, it needs fat and oil for absorption. Thus if fat is low in the diet or oil is not used for cooking, the carotene and Vitamin A will be poorly absorbed. In spite of the reported adequate Vitamin A intake among the Ata, the form in which it is present and the absence of fat in their diet could possibly result to a poor Vitamin A nutrient.

Vitamin C in the diets of the Ata came from green leafy vegetables, mainly *bago* leaves and starchy roots such as cassava and *camote*. Starchy roots and tubers can contribute a significant amount of Vitamin C in the diet, especially when consumed in large amount. This was noted among the Igorots in which as much as 87% of the ascorbic acid in their diet was derived from *camote* (FNRI, 1968).

Calcium has been found to be inadequately supplied by the diet amounting to 310 mg or 62% of the RDA. However, there has no convincing evidence that an intake of calcium even below 300 mg is harmful (WHO 1962). The body is capable of possibe adjustment within limits. However, these limits are not well defined, and may vary from subject to subject. The level of intake of calcium at which an individual attains calcium balance may be gradually lowered to a minimum for the individual at the given time. Cases of human subjects including children on diets containing .2 to .4 gm of calcium have been reported without detectable injury (Darby, 1962).

Other than diet, there may be other sources of calcium which are not accounted for in a dietary evaluation (FNRI, 1965). The chewing of beetle leaves with lime, among the Ata may add considerably to the calcium intake.

Iron intake was inadequate amounting to 59% only of the RDA. The greatest proportion was contributed by plant sources like cassava and corn. The form of iron in plant food is less readily absorted than iron from animal sources. Hence, with respect to iron, not only is their diet deficient in quantity but in quality as well.

Individual hemoglobin determination using Sahli's method of ten childbearing age Ata women was made to further assess the iron nutriture in this area. The following table shows the hemoglobin level of the Ata women:

Table 2

Hemoglobin Level of Ten Child-bearing Age Ata Women

Indicated Level of Nutrition	Number
Deficient (below 11.o gm %)	9
Low (11.0 to 12.9 gm %)	1
Acceptable (13.0 to 13.9 gm %)	0
High (14 gm % and above)	0

The result showed a range of 9 to 12 gm % of hemoglobin with an average of 10.5 gm %. None of these women were rated "deficient," only one as "low" and none as "acceptable" or "high."

The high preparation of "deficient" hemoglobin values could be ascribed to the poor iron intake which, as mentioned above, was only 59% of the RDA. In addition, source of iron in their diet being plant food is not readily absorbed.

Hemoglobin level usually is still normal even when iron stores are low. Thus, hemoglobin level falling below normal is a reflection of iron deficiency in the advanced stage (VADAG, 1983).

The B-vitamins including thiamine, riboflavin and niacin were all inadequately met which were 37%, 45% and 25% of the RDA, respectively. Corn, aside from being a major contributor of iron, also provided thiamine, riboflavin and niacin in the diets of the Ata.

Riboflavin and niacin are vitamins which are involved in tissue metabolism. Thus, deficiencies in these two vitamins are prevalent in areas where there is inadequate intake of animal food and legumes are not widely used. It is most likely to occur also in areas where there is dependence on staple, such as corn and cassava, which are poor in these nutrients. Thiamine inadequacy in the diet is common if highly milled cereals are used as staple without sources of B vitamins such as legumes and animal food (Solon, 1976).

Results of this study show that the diet of the Ata was inadequate in almost all the nutrients, except for Vitamins A and C. The least adequate in the diet were iron and the B-vitamins, thiamine, riboflavin and niacin. Fortification of the staple with these nutrients found to be very low in their diet may be desirable, economically feasible and practicable way of correcting these nutritional deficiencies (Jeliffe, 1968).

LAKE BALINSASAYAO

Meal Patterns: The usual meal pattern of the families in Lake Balinsasayao is as follows:

Breakfast

Bulad/Fish *inon-onan*
Corn
Roasted Corn Beverage

Lunch and Supper

Green, Leafy vegetables with
Squash or Kayote cooked in coconut milk
Bulad/Fried Fish/Fish *inon-onan*
Corn

Snacks (Morning and Afternoon)

Boiled root crops

In Lake Balinsasayao, breakfast consisted of corn, a protein dish (usually dried fish or fish *inon-onan*) and roasted corn beverage. For their lunch and supper, they had green leafy vegetables such as *kangkong, gabi, alugbati* and *kamote* with squash or *kayote* cooked in coconut milk; protein dish, usually *bulad,* fried fish or fish *inon-onan,* and corn. Morning and afternoon snacks consisting of boiled root crops like *kamote, gabi* or *bisol* were taken.

Nutrient Intake: Table 3 shows a comparison of the average per person nutrient intake of residents in Lake Balinsasayao in 1982 and 1988.

There was a slight increase in the caloric intake of the families from 83% of the RDA in 1982 to 88% in 1988. However, it was still below the recommended amount. Protein intake increased from 87% to 114% RDA. When caloric intakes are not sufficient to meet energy needs, the body tends to use protein for energy, rather than for their most important building and repair functions.

The proportion of plant protein remained at 75% total protein taken in. The main bulk of protein and calories came from corn. Part of the protein intake was contributed by the dark green leafy vegetable. *Bulad* (dried fish) was reported as the basic source of animal protein and to a lesser extent, fresh fish caught from the lake.

The increase in caloric intake could partly be ascribed to the common use of coconut milk in cooking vegetable and of oil in frying food. The importance of fats as vehicle of fat-soluble vi-

Table 3

A Comparison of the Average Per Person Nutrient Intake of Resident in Lake Balinsasayao in 1982 and 1988

Nutrient	1982 (Before Project)		1988 (After Project)	
	Intake	Percent RDA	Intake	Percent RDA
Calories	1816	83	1610	88
Protein (gm)	51	87	46.5	114
Calcium (gm)	.48	98	.54	106
Iron (gm)	13.5	87	8.75	85
Vitamin A (IU)	5560	110	4530	133
Thiamine (mg)	.81	70	.76	78
Riboflavin (mg)	.71	62	.67	68
Niacin (mg equivalent)	13.4	89	11.8	92
Vitamin C (mg)	72	96	97	164

tamins cannot be overstressed. Being a concentrated source of energy, greater intake of fat could supplement the caloric contribution of carbohydrate to make a more nutritionally desirable caloric distribution.

Besides providing calories and protein, corn was also the major source of iron, thiamine, riboflavin and niacin in the diet.

Iron intake which was 85% of the RDA was slightly less than the recommended amount. Eighty-six percent of the iron was derived from plant sources such as corn, camote and green leafy vegetable. As mentioned earlier in this report, plant food sources are less readily absorbed. In this case the dietary intake of iron is not a good indicator of iron nutrient since much of the iron found in the diet was from plant sources.

As shown in Table 3, there was an increase in the intake of the B-vitamins namely thiamine, riboflavin and niacin in the 1988 survey. However, thiamine and riboflavin still remained below the recommended level, 78% and 68% of the RDA, respectively. Niacin which was 92% of the RDA was adequately met. Aside from corn, niacin in the diet was derived from animal food like *bulad* and fish caught in the lake. Thiamine in this area was contributed mainy by corn and camote.

Riboflavin which was 68% of RDA was the least adequately met of all nutrients evaluated. This vitamin is largely derived from animal food and plant food (dark green leafy vegetable and legumes). Animal food which is expensive may not readily be available in the diet; green leafy vegetables which are widely accepted and consumed become more important sources of this vitamin.

The intake of both Vitamins A and C was above the recommended amount; they were 133% and 164% of RDA, respectively. These levels were an improvement of the 1982 intake of 110% and 96% RDA in Vitamin A and C, respectively. The highest sources of ascorbic acid and Vitamin A were root crops (mainly camote) and green leafy vegetable. Camote supplied 60% of Vitamin C content of the diet. Similar findings were noted among the Ata in Cangguhub in which 62% of the Vitamin

C was supplied by root crops. In addition to camote, the inclusion of more and wider variety of vegetables in the diet improved the Vitamin C nutrient of the residents in Lake Balinsasayao.

With respect to Vitamin A, more than one-half (55%) was contributed by green leafy vegetables and 90% of the Vitamin A in the diet was in the form of beta-carotene which still needs to be converted to perform Vitamin A (retinol). In the process of conversion, much of the beta-carotene is lost. Because of this. the dietary intake of Vitamin A may not be an accurate indicator of their Vitamin A nutriture.

Fats needed for the absorption of the fat-soluble vitamin is well-provided in the diet of the residents in Lake Balinsasayao. In this study, fat in the form of coconut milk and cooking oil was found to be commonly used by families in this area. The survey made in 1982 showed the lack of fat in the diet.

Calcium, one of the nutrients which was commonly found to be inadequate in the Filipino diet, was more than adequately met, representing 106% of the RDA. A large proportion of calcium in the diet was derived from green leafy vegetables and camote root crop. *Bulad* and corn also contributed a considerable amount of calcium in the diet.

Health Condition of Children

Of all population groups affected by malnutrition, young children need most attention. Protein-energy malnutrition among young children is still a severe problem in many developing nations such as the Philippines. The underlying cause is basically lack of food. These children become more susceptible to infectious diseases which can aggravate their poor health condition. The weaning period, when the child is gradually or abruptly taken off the breast and given other food, has been identified with the overwhelming problem of protein-calorie malnutrition and other deficiency diseases. The culturally prescribed weaning food is usually soft carbohydrate food rice, corn camote or cassava. In most cases, hygienic condition is far from desirable and is compounded by a lack of safe drinking water.

A healthy child is expected to grow normally, hence, growth has been used as an index of health. Anthropometric measurements are practical indicators of the rate of growth of children with the assumption that growth is made possible through adequate intake of the essential nutrients. Anthropometric measures therefore reflect nutritional status. There is actually no single indicator of an individual's nutritional status. There are several parameters used such as dietary intake, biochemical test, anthropometric measurement and clinical assessment. However, body measure or anthropometric measurement is considered to be more practical because of their objectivity and simplicity. The actual measurements are compared with an accepted standard.

Among the Ata, 18 out of 21 children (0-6 years) weighed were found to be suffering from varying degrees of malnutrition (Table 4). Among the children below two years of age, 87.5% were below the desirable level. All of the children in the 3-4 year category were found to be malnourished. In the 5-6-year age group, 72% were found to have weights below the standard.

The height measurement showed that one-half of the Ata children in the two-year-old category were below 90% of the standard height. The same was true with two-thirds of those in the 3-4-year age group, and three-fourths of those in the 5-6-year age group (Table 5).

In Balinsasayao, 29 out 32 children had weights below the desirable level (Table 6). Among the children below two years old, 83% were found to be suffering from first and second degree malnutrition, as well as 92.5% of the 3-4-year age group. Seventy percent of those in the 5-6-year age level were suffering from first degree malnutrition. There was no incidence however of severe malnutrition (third degree) in any of the age groups. The height measurement revealed that all of the children below two years old had heights below 90% of the standard; this was true also for 62% of those in the 3-4-year age group and 70% of those in the 5-6-year age group (Table 7).

Considering that in Cangguhub, only 38% (8 out of 21) were found to be suffering from second and third degree malnutrition and only 11% (4 out of 35) in Balinsasayao were found to

belong to the same category, the children in general were able to maintain physical growth rates at reasonable levels in spite of inadequate intake of most nutrients. It was also noted that other clinical manifestations of malnutrition were found among the children. Nutritional studies have indicated that in spite of chronic energy deficit, most children are able to maintain physical growth rates at reasonable levels and this is attributed to what nutritionists call as "adaptation." This means that malnourished children undergo metabolic and behavioral adaptations in order to reduce the impact of nutrient scarcity, with the overall strategy of conserving whatever tissue is left by reducing both anabolic and catabolic processess. In addition, there is a decrease in physical activity, further conserving energy. In short, "adaptation" enables the body to adjust to nutrient scarcity.

The Negrito families depend mainly on their food crops for subsistence. Because of the fact that the area is isolated and not readily accessible to modern transport system, procurement of food supply from the nearest market is a problem. To a little extent cash cropping is being practiced. This generates some money to purchase essential goods such as soap, matches, salt, sugar, kerosene, aside from fresh and dried fish which are occasionally bought when they got a chance to go marketing in a nearby barrio. In short, subsistence farming, lack of adequate cash income, their remoteness from the source of food and essential goods all contribute to the marginal food supply of the people in Cangguhub

Miscellaneous Activities

The following activities had been done by the Health and Nutrition Team aside from the dietary survey and anthropometric measurements:

1. Nutrition Education

   Lecture on:

   a. the importance of food to health

   b. basic food groups

   c. breast-feeding

   d. diet of pregnant and lactating women

Table 4

Number and Percentage of Preschoolers by Nutritional Levels Based on Body Weight (Cangguhub)

	Normal		Overweight		First Degree Malnourished		Second Degree Malnourished		Third Degree Malnourished		
Age Group	No.	%	No.	%	No.	%	No.	%	No.	%	Total
2 years and below	-	-	1	12.5	3	37.5	3	37.5	1	12.5	8
3-4 years	-	-	-	-	5	83.0	1	17.0	-	-	6
5-6 years	1	14.0	1	14.0	2	29.0	1	14.0	2	19.0	7

Table 5

Number and Percentage of Preschoolers by percent Desirable Height (Cangguhub)

	19-100%		81-90%		71-80%		61-70%		Below 60%		Over 100%		
Age Group	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Total
2 years and Below	2	25.0	1	12.5	1	12.5	1	12.5	1	12.5	2	25.0	8
3-4 years	1	16.5	4	67.5	-	-	-	-	-	-	1	16.5	6
5-6 years	1	14.0	3	44.0	1	14.0	1	14.0	-	-	1	14.0	7

Table 6

Number and Percentage of Preschoolers By Nutritional Levels Based on Body Weight (Balinsasayao)

	Normal		Overweight		First Degree Malnouorished		Second Degree Malnourished		Third Degree Malnourished		
Age Group	Number	%	Number	%	Number	%	Number	%	Number	%	Total
2 year old and below	2	17.0	-	-	7	58.0	3	25.0	-	-	12
3-4 year old	1	7.5	-	-	11	85.0	1	7.5	-	-	13
5-6 year old	2	20.0	1	10.0	7	70.0	-	-	-	-	10

Table 7

Number and Percentage of Preschoolers by Precent Desirable Height (Balinsasayao)

	91-100%		81-90%		71-80%		61-70%		Below 60%		Over 100%		
Age group	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Total
2 year old and below	-	-	10	84.0	1	8.0	1	8.0	-	-	-	-	12
3-4 years	5	38.0	7	54.0	1	8.0	-	-	-	-	-	-	13
5-6 years	3	30.0	6	60.0	1	10.0	-	-	-	-	-	-	10

Demonstration on the preparation of:

a. supplementary foods for infants

b. a low-cost complete meal:

Fried bulad

Mongo with malunggay

Corn

Banana

2. Initiated health examination of children and women of child-bearing age by inviting an intern from the Silliman University Medical Center (SUMC) and health workers from Mabinay.

Summary and Recommendations

Health and nutritional concerns have always been considered as an integral part of any development program. A preliminary survey was conducted in Cangguhub which tried to establish the present food and nutrition situation in the area. The survey collected data on food availability, purchasing power, food preparation practices, food intake, nutritional needs of household members, water supply and environmental sanitation.

Another study was conducted in Lake Balinsasayao. This was a follow-up of the investigation conducted in 1982 to find out if there was any improvement in the dietary intake of the residents considering that a development program was formally implemented in the area since 1984.

Results of the survey showed that the diet of the families in Cangguhub was grossly inadequate caused by lack of food especially during the dry season. They subsisted mainly on staples which are high in starch such as corn, cassava and *camote* roots. Body building food such as animal protein were seldom eaten. The same was true even for the protective food such as fruits and vegetables. All nutrients, except vitamins A and C were below the RDA. Since vitamin A was derived mainly from vegeta

bles, it is in a form (carotene) that is not directly utilized by the body. Much of this is lost in the process of converting it to the active form of the vitamin. Since fat is low in the diet, it could mean that this vitamin will be poorly absorbed. Protein intake was low and at the same time it was derived mainly from plants. Plant proteins are in general partially complete. In addition, the calorie intake was inadequate, only 64% of the RDA, which could mean that most of the protein will be utilized by the body for the much needed energy instead of using it for tissue-building.

The weight and height measurements among the preschool children revealed the existence of varying degrees of malnutrition. Using weight as an indicator of nutritional status, 48% were found to be suffering from first degree malnutrition, 24% from second degree, and 14% from third degree malnutrition in Cangguhub.

The result of the 1988 dietary survey in Lake Balinsasayao showed an improvement in the nutrient intake compared with that of the 1982 result. Although there was an increased intake of the B-vitamins, it was still below the recommended level. It was also noted that coconut milk and cooking oil were widely utilized in the farmers' daily diet, a practice which considerably improved the intake of fat. They still depended on plant sources for their protein, iron and vitamin. The low intake of animal food was reflected on the low level of thiamine and riboflavin intake. The improvement in the dietary intake of the families in Lake Balinsasayao could be attributed to the new farm techniques introduced by SURADPU and the nutrition education provided by the personnel assigned in the area.

Anthropometric measurements indicated that most of the preschool children were suffering from mild and moderate malnutrition. Although there were only 6 out of 35 who had weights comparable with the standard, there was no incidence of severe malnutrition among the children in Lake Balinsasayao.

The main thrust of the nutrition component in this development program is to improve the food intake of the families in Cangguhub and Balinsasayao, both in quantity and in quality.

Appendix A

Weight of Preschoolers In Cangguhub

NAME	AGE (MONTHS)	WEIGHT (KILO)	NUTRITIONAL LEVEL
1. Baldado, Amado	60	9.5	9
2. Baldado, Bingbing	4	3.6	9
3. Baldado, Danilo	72	13.6	6
4. Bornea, Fedi	48	13.2	3
5. Bornea, Jo Ann	4	5.0	4
6. Briones, Danilo	2	3.2	7
7. Dan Lebiste, Cherry	72	15.0	4
8. Dan Lebiste, Liza	5	14.0	OW
9. Dan Lebiste, Mayvi	36	11.8	3
10. Dumdum, Eden	72	23.6	OW
11. Dumdum, Lani	60	17.3	N
12. Dumdum, Rowe	48	13.2	3
13. Mambaye, Bebeth	24	9.5	5
14. Mambaye, Rico	48	13.0	3
15. Pabillan, Irene	24	10.5	3
16. Pabillan, Jimmy	72	10.9	8
17. Pabillan, Myrna	48	14.0	2
18. Paladar, Saturnina	6	5.9	4
19. Requel, Brenda	72	16.4	2
20. Requel, Edwin	12	7.5	5
21. Requel, Mike	36	10.0	5

Level 1—Normal

Levels 2-4—First Degree Malnourished

Levels 5-7—Second Degree Malnourished

Levels 8-10—Third Degree Malnourished

Appendix B

Weight of Preschoolers in Lake Balinsasayao

NAME	AGE (MONTHS)	WEIGHT (KILO)	NUTRITIONAL LEVEL
1. Abing, Edna	7	8	N
2. Abing, Theresa	72	17.5	2
3. Abing, Veronica	43	14.0	2
4. Batal, Geraldine	62	14.0	4
5. Batal, Mabini	9	7.5	3
6. Bulagao, Agucilda	42	15.5	N
7. Bulagao, Alberto	24	10.0	4
8. Bulagao, Andrelo	3	5.5	N
9. Orcia, Ivy	9	8.5	2
10. Orcia, Juvy	72	19.0	N
11. Orcia, Maricel	37	13.0	2
12. Orcia, Melanie	62	16.0	2
13. Orcia, Richard	39	13.0	2
14. Orcia, Ritchel	15	8.0	7
15. Quilpio, Cirilo	72	18.5	2
16. Quilpio, Melou Jane	10	8.0	3
17. Quilpio, Reynald	50	13.5	3
18. Rosiana, Charito	46	14.0	2
19. Rosiana, Darcyl	9	7.0	4
20. Rosiana, Imelda	66	16.0	2
21. Sotillo, Antonio	45	11.5	5
22. Sotillo, Marcia	40	14.0	2
23. Sotillo, Marissa	66	13.5	

Appendix C

Height Measurements of Preschoolers in Cangguhub

NAME	AGE (MONTHS)	HEIGHT (CM)	PERCENT STANDARD
1. Baldado, Amado	60	76.2	70
2. Baldado, Bingbing	4	60.9	94
3. Baldado, Danilo	72	94.0	82
4. Bornea, Fedi	48	95.2	92
5. Bornea, Jo Ann	4	62.2	96
6. Briones, Danilo	2	72.4	118
7. Dan Lebiste, Cherry	72	99.0	86
8. Dan Lebiste, Liza	5	29.2	44
9. Dan Lebiste, Mayvi	36	86.4	90
10. Dumdum, Eden	72	118.0	103
11. Dumdum, Lani	60	104.0	95
12. Dumdum, Rowe	48	83.8	81
13. Mambaye, Bebeth	24	73.7	83
14. Mambaye, Rico	48	83.8	81
15. Pabillan, Irene	24	82.5	93
16. Pabillan, Jimmy	72	88.9	77
17. Pabillan, Myrna	48	104.0	101
18. Paladar, Saturnina	6	88.9	132
19. Requel, Brenda	72	99.0	86
20. Requel, Edwin	12	66.0	80
21. Requel, Mike	36	78.7	81

Appendix D

Height Measurements of Preschoolers in Lake Balinsasayao

NAME	AGE (MONTHS)	HEIGHT (CM)	PERCENT STANDARD
1. Abing, Edna	7	60.9	88
2. Abing, Theresa	72	91.4	80
3. Abing, Veronica	43	86.4	84
4. Batal, Geraldine	62	94.0	86
5. Batal, Mabini	9	66.0	89
6. Bulagao, Agucilda	42	90.2	94
7. Bulagao, Alberto	24	73.6	82
8. Bulagao, Andrelo	3	36.8	58
9. Orcia, Ivy	9	60.9	85
10. Orcia, Juvy	72	104.0	91
11. Orcia, Maricel	37	82.5	86
12. Orcia, Melanie	62	95.2	87
13. Orcia, Richard	39	80.0	82
14. Orcia, Ritchel	15	60.9	74
15. Quilpio, Cirilo	72	104.1	91
16. Quilpio, Melou Jane	10	60.9	84
17. Quilpio, Reynald	50	96.5	93
18. Rosiana, Charito	46	91.0	89
19. Rosiana, Darcyl	9	60.9	82
20. Rosiana, Imelda	66	94.0	86
21. Sotillo, Antonio	45	82.5	80
22. Sotillo, Marcia	40	91.4	95
23. Sotillo, Marissa	66	95.2	83

The following are recommended:

1. Selective Food Production—planting nutritional fruits and vegetables such as green leafy vegetables and yellow vegetables: mung beans and other legumes such as *tabios* and *tahores;* coconut and peanuts to increase fat increase fat intake; raising of animals such as chicken, pigs to improve animal food intake.

2. Nutrition Education Program — proper meal planning and food preparation; preparation of supplementary food for infants; encourage mothers to continue breastfeeding and teach them proper techniques.

3. Increase Cash Crop Production — to improve cash income.

4. Safe Water Supply System — to improve health and sanitation.

5. Periodic Health Examination — to be performed by a physician in order to control infections and to check any deficiency disease.

References Cited

Bulatao, J., D. de la Paz, C. C. Gervacio. (1972). "Recommended height and weight standard for Filipinos." *Philippine Journal of Nutrition* 24 (3) : 180.

Darby, W. C. (1962). "Adaptation to sub-optional nutrition with respect to protein and calories." (Symposia of the Swedish Nutrition Foundation) August 29-31, 93ff.

(1975). *Human Nutrition and dietetics* G eat Britain: Churchill Livingstone.

Fontelo, C. B. (1985). "Assessment of nutritional status of residents in the Lake Balinsasayao area." *Silliman Journal* 32 (1-4) : 65-92.

Florencio, C. A. (1986). "Is small beautiful?" Second Professional Chair Lecture. University of the Philippines.

Food and Nutrition Research Institute (1980). *Food composition tables* (Handbook I). National Science and Development Board. (Fifth Revision).

— (1969). *Nutrition survey in Eastern Visayas Region* National Science and Development Board.

— (1968). *Nutrition survey in Western Visayas Region* National Science and Development Board.

— (1965). *Nutrition survey of Southern Tagalog Region.* National Science and Development Board.

Nutrition Center of the Philippines (1978). *Level by weight for age.* National Science and Development Board.

Jeliffe, D. B. (1968). *Infant nutrition in the subtropics and tropics.* Geneva: World Health Organization.

Solon, F. (n. d.). *A deficiency, anemia and goiter control handbook.* Makati: Nutrition Center of the Philippines.

— (1976). *Physician's manual on malnutrition.* Manila: Nutrition Center of the Philippines.