

HOME AND VILLAGE BASED WEANING FOODS IN THAILAND

by

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EXECUTIVE SUMMARY

I. PURPOSE

At the request of USAID/Bangkok and the Institute of Nutrition, Mahidol University, Bangkok, I went to Thailand July 4-10, 1982, as a consultant on home and village prepared weaning foods. Purpose of the trip was:

- (1) To review the compositions of supplementary food mixtures developed by the Institute, and in view of Ministry of Health plans for a greatly expanded program in the country, to examine in particular the potential for the use of winged beans in community-based weaning food projects in addition to soybeans and mung beans as protein sources (Bangkok 24088).
- (2) To review progress with weaning food developments in several locations in Thailand, including new preparation techniques, and to discuss with the Minister and with USAID the role of these new approaches in the expanded Ministry of Health project (State 173134).

II. BACKGROUND

Three sets of projects can be identified in the expanding Thai weaning food initiative, all involving village cooperatives which prepare, package, and sell or distribute weaning mixtures using techniques developed by the Institute of Nutrition and following Ministry of Health guidelines. These are:

- (A) World Bank Project in 90 Villages. This is directed by Mahidol University and the Ministry of Health, and grew out of the original pilot project by the Institute in a half dozen villages.

- (B) Ministry of Health/USAID Project. The aim of this project is to expand the original effort to some 1,200 villages in the first year and many times this number in the following years.
- (C) Projects Supported by Other Donors. Similar projects are supported by other donors such as the German Volkswagen Foundation, the Rotary Club, and Coca Cola. In general these projects are directed by local health officers and follow Ministry of Health guidelines, though not under Ministry direction.

As stated in the main text of this report, the most remarkable aspect of these projects is not only that they seem to be working in the villages I visited, but also that they were described in the same enthusiastic terms by the Minister himself, the Director of the Institute, and District Health Officers. In addressing Paragraph Two of the Scope of Work, I have made a special effort to review briefly some of the important features of these projects, in order to highlight their essential similarities.

During my brief consulting mission (five working days), I was able to visit six villages embracing each of the above categories, accompanied by different nutrition and health professionals, and to speak with key members of the Ministry, Institute of Nutrition, members of donor agencies, project volunteers, students, and district officials in health, nutrition, education, and agriculture.

III PRINCIPAL RECOMMENDATIONS

- (1) Of the seven weaning recipes developed by the Institute of Nutrition during the 1976-80 pilot phase, four were in current use in the projects I visited and appeared to be acceptable to mothers and well tolerated by the majority of infants. These recipes are based on rice plus soy or

mung beans (as a protein source) plus sesame or groundnuts (as a source of oil as well as additional protein). The three recipes using fish meal were not in use because the latter was said to be in short supply (Table I).

- (2) In addition to food processing and distribution, most projects have three additional components: (a) village health care, (b) nutrition education, and (c) income-generating activities. In three of the villages I visited, one or more of these components was missing and the project was judged to be a disappointment. 1st and 2nd degree malnutrition was increasing, for example, although there was a concurrent decrease in 3rd degree malnutrition. Persons involved attributed poor project performance specifically to the absence of a vigorous nutrition education component, and one may conclude that the food supply program is insufficient without the latter.
- (3) Projects appeared to be successful where electricity is available and electric mills are used. It happens that the three villages mentioned above are without electricity and stone grinding which was slow and ineffectual was used at first. In 1980 and 1981, both nutrition education and manual grinders were introduced, and results are said to be much better now (no formal evaluation has taken place). My impression is that both nutrition education and effective grinding facilities are essential.
- (4) The introduction of winged beans in weaning recipes, while technically possible, would be extremely difficult in most areas of Thailand at present. Factors favoring introduction:
 - (a) The winged bean has been traditionally cultivated between latitudes 20 North (Bangladesh, Northern Thailand, Northern Burma) and 10 degrees South (Melanesia, Comoro Islands); the bean thrives in hot

humid areas with 2500mm. or more rainfall.

- (b) Yields are comparatively high and mature dry seeds comparable to soybeans and peanuts. The seeds can be steamed, boiled, fried, roasted, fermented, or made into milk, tofu, or tempe.
- (c) The winged bean is relatively drought resistant, compared with some cereals and other legumes grown in this ecological area.

Factors opposing introduction:

- (a) The winged bean is not popular as a food in Thailand and some other countries where it is grown, apart from the pods which are popularly eaten raw or cooked in different forms.
- (b) Farmers producing winged beans for sale have difficulty finding a market. Other similar crops are considered easier to grow and are better liked.

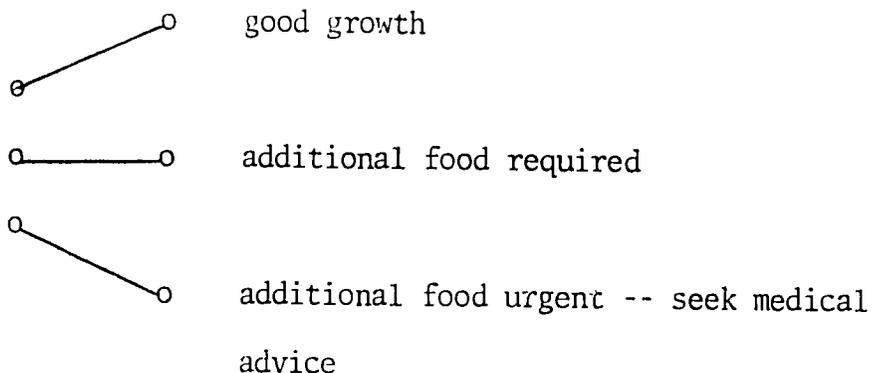
Improved winged bean seeds might be made available to farmers on a trial basis in a number of villages, realizing that their use would be primarily as a fresh green; no priority should be given to the use of the mature bean in weaning foods until there is much further evidence of acceptability.

- (5) The variations in approach in different projects and villages, although seemingly minor, need to be recorded and their effects evaluated. A great deal can be learned to benefit further extension of the program within Thailand and to other countries by giving a high priority to such evaluations.
- (6) The pricing structure still needs to be carefully examined in each of the different projects, to be sure that there really is a profit for the nutrition cooperatives which have been set up, as a stimulus to them and for them to invest in related health measures. Cost-effectiveness still needs to be examined for these projects as related to each

other and as related to the alternatives of larger plants at regional and higher levels.

IV. OTHER RECOMMENDATIONS

- (1) Support of program expansion by USAID for only one year is inadequate. As soon as possible this action should be reviewed on the basis of progress and funding for expansion in additional years sought.
- (2) The weight charts can be improved by the addition of simple lines connected by dots increasing, decreasing or remaining the same to assist interpretation more or less as follows:



- (3) The growth charts can be made more useful by the addition of simple diagrammatic instructions for oral rehydration. There also needs to be more emphasis on oral rehydration throughout the program.
- (4) In village programs emphasis must be placed equally on production and consumption, i.e. production or sale in other villages or the district hospital, though the district hospital must not become the principal goal.
- (5) A systematic mechanism for testing the weaning foods for aflatoxin should be instituted and guidelines provided for minimizing this hazard.

- (6) Far more studies on the shelf-life of the weaning foods are required and of the factors affecting it.
- (7) At some point there should be a shift in usage of Thai standards as a reference to the international standards of WHO but this is not of immediate concern.

V. SUMMARIZING COMMENTS

Stemming from a revised and enlightened concept of primary health care that gives a high priority to measures for the improvement of mother and child nutrition and health, public health authorities and health workers at all levels in Thailand have developed a remarkable understanding of an enthusiasm for preventive measures at the home and village level. One of the most impressive of these measures is the institution of village weaning food projects using a series of formulas based on mung-bean, sesame, ground nut (peanut) and soy combined with rice. These can actually be prepared within the village by members of "nutrition cooperatives."

A program has been initiated that in the last two years has spread from the original four villages to over a hundred and is projected to reach a thousand by the end of the year with ambitious plans for three thousand by the end of 1983. This would cover an approximate 25% of the 12,000 villages. In the initial villages the nutrition co-op members are actually roasting, mixing, and packaging the ingredients themselves and these are being sold and used as weaning foods.

Such a program would be of limited value, unless it were combined with an equally vigorous effort to ensure the periodic weighing of all young children, the maintenance of weight charts in the home and the use of the charts to indicate when breast milk alone is no longer sufficient and complementary feeding must be introduced or the level of supplementary feeding must be

increased. It is the prior establishment of these program related efforts and the parallel establishment of health cooperatives for the distribution of drugs, that makes rapid expansion of the home and village weaning food programs feasible and likely to succeed. The support of expansion of this program by USAID is to be highly commended.

Report of a Visit to Thailand

July 4 - 10, 1982

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I. Introduction

In 1972 I was involved in a three-day workshop held in the regional office of UNICEF and attended by representatives of the Ministries of Health, Education, Agriculture, and Economy concerned with food and nutrition. These were formed into multisectoral teams to examine the role of nutrition in each of the four sectors represented. Dr. Kalyan Bagchi, Joseph Wray of the Rockefeller Foundation, James Levinson and myself from MIT functioned as resource persons. At that time, it was recognized that despite an apparently well-developed system of hospitals, health centers, midwifery centers, and others, fewer than a fifth of the population was reached by them. This is roughly the situation prevailing in the other non-Communist countries of Asia, Latin America and Africa.

The workshop was convened to make recommendations for a food and nutrition policy to be incorporated into overall national planning in each of the sectors represented. In the health area, it focussed on extension of nutrition-related activities within the health services to be extended to reach a much greater proportion of the population with nutrition education, availability of appropriate weaning foods, the weighing of young children, improved environmental sanitation and personal hygiene to reduce diarrheal disease, immunization and a number of other maternal and child health activities. A subsequent visit in 1973 focussed on the activities of the Food Technology and Product Development Center at Kasetsart University in developing a number of centrally-processed vegetable mixtures for use as weaning foods and for school feeding programs. The multidisciplinary team

from MIT and Harvard included food scientists, a food marketing specialist, a non-medical nutritionist and myself as medical nutritionist and produced a report entitled "High Protein Product Development Efforts in Thailand" that made a number of suggestions for improving the acceptability of their products and promoting their use. Despite their technical feasibility, these centrally processed weaning foods have not proved helpful in reaching the rural poor.

In some important aspects the situation in Thailand has now changed remarkably since that visit. It is now enthusiastically embarked on an ambitious program of primary health care -- Thai style -- that is unique and encouraging. This is taking place despite the fact that only 15 to 30% of the total population is being served by the hospital, health centers and other conventional health care delivery activities that have consumed the great bulk of the total allocated budget. Thailand is now developing mechanisms to introduce the important elements of primary health care directly into the villages through activities that are primarily the responsibility of the villagers themselves. This is vastly different from the usual policy of expecting services to be provided by health personnel in health centers, midwifery centers and the like.

The program is based on recognition that population groups living in rural areas rarely benefit from health services because they cannot spare the time or money to travel long distances for medical reasons unless seriously ill or injured. When they do so, they often find crowded facilities, long waits, and inadequate attention from a small medical staff lacking in supplies. The new program considers effective communication to be the most essential component of health prevention and promotion. Most importantly, it does aim to make available a limited number of the most effective modern medicines.

Medical treatment and environmental sanitation continue to be district level and provincial level responsibilities, but at the village level the essential components are health education, promotion of food and nutrition, mother and child

health and family planning, control and prevention of local endemic diseases, environmental sanitation and provision of clean water supply, immunization, and treatment of simple illnesses. The aim of the health education element is to transform village volunteers into village-level health educators who are able to transmit knowledge and information to the community.

Central to the program is the identification of a strategy to achieve the objective of extending primary health care as broadly conceived to all villages in the country. Recognizing that traditionally it has been the elders of the family or the community who provided health care and advice, the Thai program is designed to support and enhance this role of the elders through effective training. Achieving better health of the population is seen to be primarily a matter of health promotion and prevention rather than of curative medical services, even though the latter are generally seen as the need and the former are not sought after or considered essential by either most of the villages or by conventionally trained physicians and other health workers.

To implement this policy, families are grouped together in terms of the frequency of communication and contact, and the person most in contact with families within the group is selected as a "village health communicator" (VHC). After selection, they are given about a week of training within the village mainly by a sanitarian from the district and given work guidelines "to serve as disseminators of knowledge and information to their groups of 10 to 15 families." Health information is usually disseminated informally and inter- and intra-group exchanges and transmission are expected to occur. It is also expected that villagers will come to understand health problems and needs so that they can contribute to the health problem solution work plan of the village.

Usually a health communicator who has proved outstanding in the preliminary training period is, in theory at least, selected by the village for further training to serve as the village health "volunteer" (VHV).

They are given one to two weeks of additional training at the district level in simple skills for treatment of minor or common illnesses and injuries. They then provide simple curative care, including the sale at minimal cost of a small number of medicines provided by the government. Money is collected for them and the cost is repaid with a small profit for the villagers to use in any way they desire. To oversee the collection and use of this money, health cooperatives are formed in each village. The nutrition cooperatives to be described later follow similar principles in the production and sale of village-produced weaning foods.

The main concepts of primary health care in Thailand can be summarized as follows:

1. It represents a supplementary health system at the community and village levels with cooperation of the community and assistance of the state.
2. It is intended to equip the community with capability to solve its own health problems through community participation and cooperation.
3. It can come into being only when the community recognizes and accepts the health problems of the community and cooperates in finding ways to tackle them.
4. Government officials do not work in place of villagers and villagers do not work for the officials. Villagers work to insure better living of the community with the slogan "Public Health Services of the Community, by the Community, and for the Community."
5. Community involvement is the heart and soul of public health care activities and can support them with labor, money, and cooperation on a voluntary basis.

6. Good health is related to living conditions and life status so that primary health care activities must be integrated with other development activities such as agriculture, education, cooperatives and community development.
7. Primary health care activities must utilize simple technology and techniques that are within the capability and resources of the community.
8. Primary health care activities must be in harmony with the existing institutions and the daily life of the community.
9. PHC work should be flexible in its application to the social conditions and problems of individual villages. Hence, its pattern of work will differ among villages. It also differs because of differences in the emphasis of the district health officers and others responsible for the implementation of this primary health care vision.

There are so many variations in fact that it was impossible in the brief time at my disposal to sort them all out and catalogue them. The original pilot village appears to have been Nong-hai, 1978-1980, with support from the Ford Foundation, UNICEF and the International Development Research Center of Canada (IDRC). In 1979, a similar type of pilot project was carried out in three villages of Tra-karn district, namely Lai Tung, Lai Soong and Ban Dang. Another pilot study was done to evaluate the nutrition education component using video tape and radio to promote proper supplementary feeding. It began in 1981 involving 948 villages, 24 in Ubon and 24 in Sri Sa Ket. Still another integrated health, nutrition and rural development project started in May of 1981 in 8 villages of Warin district, Ubon province.

In 1981 the Ministry of Health initiated a program in 3 provinces: Ubon, Udon, and Korat, each with 30 villages. I also visited a program initiated in 5 villages of the Rarsi Sa Lai district of Sri Sa Ket province initiated by the local district health officer with Ministry of Health approval and support, but not as part of Ministry initiative.

The most remarkable aspect of these programs is not only that they seem to be working in the villages I visited, but also that they were described in the same terms and viewed with the same enthusiasm by the Minister of Health himself; the Director of the National Institute of Nutrition, whose pilot and field studies and teaching of young physicians made way for these developments; the Director of Health Services, who has been responsible for their rapid replication and extension, and by the District Health Officers who are implementing the program in villages of their district and training and supervising the village health volunteers who are crucial to the success of the strategy.

It is this background that led the Health and Population Division of the USAID mission in Thailand to insist on re-programming 2,000,000 dollars of unexpended funds to enable the Ministry of Health to add another 1080 villages. Although they sought authority to extend the program for two years, they succeeded in obtaining only one year of the US support. However, the government considers the primary health care program so important to its objectives, especially the nutritional component, that it hopes to have the program implemented in 2,000 villages by the end of this year and in 5,000 by the end of 1983. It is estimated that out of some 50,000 villages in Thailand about 12,000 are in 286 districts that are so poor they should be given priority. Out of 72 provinces a total of 37-- 16 in the northeast, 16 in the north and 5 in the south -- are in this category.

Although the Ministry of Health is taking the leadership, it considers that these projects must be multisectoral and involve Ministries of Agriculture,

Education and Industry. It estimates that about 60% of district health officers are now informed and ready for the program. For the village weaning food component it hopes to have 400 producing villages and 2,000 villages using the village-prepared weaning food. These numbers are expected to increase by the end of 1983 to 1,000 producing villages and 5,000 consuming villages. Most of the necessary funds are to be generated within the community through the health cooperatives and nutrition cooperatives and they are envisaged as self-sustaining community programs.

II. Nutrition Activities - Child Weighing and Village Prepared Weaning Foods

There are three projects currently under the supervision of the National Institute of Nutrition at Mahidol University. I had an opportunity visit one or more villages in the 90-village Ministry of Health project supported by the World Bank and the Rarsi Sa Lai district project in Sri Sa Ket province. In all of these the initial weighing of all available infants and preschool children, the establishment of weight charts either left in the hands of the mother or maintained in duplicate by the mother and project personnel, periodic weighing, and conveying information on the appropriate feeding of young children are essential components, as is the provision for 2 Baht (one Baht is approximately 5 cents U.S.), of a 250 g. packet of weaning mix, enough to make four glasses

The ingredients and composition of supplementary food formulas shown in Table 1 were established by INMU. Mixtures in current use are chosen from among the first four, since neither fish meal nor oil are readily available. The preparation of the supplementary food mixture follows a simple technique. Beans, groundnut (peanut) and sesame are roasted first in order to obtain simultaneously well-cooked ingredients. In addition, roasting of these ingredients gives an aroma to the food mixture. Rice is roasted for a shorter period of time of 3 to 5 minutes to kill contaminating organisms. Roasting also reduces moisture content and hence increases the storage time. After roasting, each ingredient is weighed and mixed

proportionately with other ingredients of the mixture.

In some Ministry of Health programs, the mixture is ground with an electric grinder supplied by UNICEF, that is capable of grinding one kilogram of the mixture in 5 minutes. In the INMU project villages and in Ministry of Health villages without electricity the grinding is done with a hand grinder. The ground mixture is then sealed in plastic bags of 100 grams per package, providing approximately 450 calories. To cook the weaning food, the ground mixture is immersed in 6 times its volume of water, stirred and boiled at 100 degrees C. for 10 to 15 minutes. Examples of the variations on this procedure are the regrinding to a finer mesh in some villages so that the material may be reconstituted with boiling water and no further cooking, and for older children, a mixture of rice and groundnut that is not ground. The type of electric mill suitable for grinding rice, sesame and mung bean cannot be used with whole soybean because the latter forms a paste due to its higher oil content and must be ground in a different kind of electric mill.

In some villages whole soybeans are cooked, and a milk is extruded by squeezing them in a fine cotton cloth. The residue, still containing half of the protein, is combined with sugar, cut into thin slices and sun-dried for sale as a snack food to be deep fat fried. The area and villages I visited are shown in Fig. The individual projects are described briefly below.

1. IDRC project in Pibun district (1979-1982)

This project involves 2 Nong Hai villages with a total population of about 21,700 from about 236 households. This project has four components: 1) nutrition education, 2) food supply, including village weaning food production, 3) income-generating activities and 4) preventive, promotive and curative health efforts. Formulas used in this project are one, two, and four of Table 1 and electric grinders are used. The formulas are accepted by 90% of infants and 50% of toddlers. Ninety-eight percent of the children are stated to have been immunized with DPT

and BCG, and the percentage of latrines is said to have increased from 26% in 1974 to 60% in 1982. Pregnant women receive nutrition classes, and birth weight is obtained either at delivery or within 24 hours. Mothers of children with 1st degree malnutrition receive nutrition education and those with 2nd degree malnutrition, supplements to take home. The prevalence of 2nd degree malnutrition is stated to have decreased from 30 to only 10% with no cases of 3rd degree malnutrition. Squash and coconut are provided for all older children and to mothers who introduce them to these foods. Growing them at home is encouraged. Formulas 6 and 7 were tried out in this village but the fish taste proved unpopular.

Children 0 to 18 months are weighed monthly, those 19 to 36 months every two months, and those 37 months to 5 years, every three months. For older children the weaning food mixture is ground more coarsely and put into a cheese-cloth bag so that it can be cooked in the family pot along with the family's food. This has proved popular and is now in use in the 48 villages of the Volkswagen Foundation project in Warin district. This is expanding rapidly, and will be described below.

In the three villages without electricity in Tara Karr district, Ban Dang, Lai Tung, and Lai Soong this program was implemented with a vigorous program of food production, processing and distribution using a manual grinder in the village, but without preventive and promotional health services, and only sporadic nutrition education. The program was a failure as judged by an increase in 1st and 2nd degree malnutrition and a decrease in individuals within 10% normal, although there was a decrease in 3rd degree malnutrition. They conclude from this that the food supply program is simply not enough without a vigorous nutrition education component. The stone grinding was also slow and ineffectual. In 1980 and 1981 the nutrition education package was introduced and a manual grinder procured. The results were said to be much better now but actual data were not presented.

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In addition to the two Nong Hai villages, three villages in Trakarr district were given, at the same time, the same food supply and income generation programs, but no health prevention or promotion and only occasional nutrition education. The results in these control villages will be compared with Nong Hai.

2. Belgium EEC Program in Nong-Klan subdistrict

This program is being implemented in 10 villages with about 4,500 population, by existing local district health officers and includes all four components:

- 1) Health (curative, preventive and promotional)
- 2) Nutrition education (person-to-person, growth chart, slides.)
- 3) Food supply (food supplementation or weaning food distribution processing center in Nong Hai)
- 4) Income generation (home industry - weaving, etc.)

Begun in 1979, the program has eliminated third degree malnutrition. Mothers whose children are normal or with first degree malnutrition are encouraged to buy the weaning food packages. If mothers of children with second degree malnutrition are not able to afford the packages, they are encouraged to bring raw materials for processing to barter for the packages.

3. German Volkswagen Foundation-Supported Program in Warin District

This is a well-designed research program in 8 villages of which 6 have the health program with preventive, promotional and curative health services and nutrition education. Of these, two villages have in addition income-generation activities, two have food supply activities in addition, and two have both income-generation and food supply activities. In the remaining two villages no supplementary programs are provided at present. The design is further complicated by the fact that one village in each pair has irrigation for agriculture and

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the other does not. For this study, which is patterned after the Belgian EEC one, 50,000 dollars were provided to INMU for 2 years by the German Volkswagen Foundation. Part of these funds were used for a building in Udol with a conference room, two laboratories, store room and eight small rooms for staff to stay.

I visited the town of Mod-Gnam, which had all four components of the program and irrigation. The first element, the health cooperative, was established after a visit of several days of a health team from the district made up of a pharmacist, a nurse and a district health officer. The team had the responsibility of motivating the community and promoting cooperation. They used the group dynamic approach, including both games and panel discussions. A health cooperative was then formed, health promoters trained, a health volunteer selected for 5 days additional training, and ultimately 40 drugs were provided, which the health volunteer has been taught to dispense.

In this village the nutrition cooperative prepares food for school feeding by passing soybeans through a manual grinder, mixing them with rice for 15 minutes' cooking. The proportions are one part of rice to one part of soy to ten parts of water. Nutrition education is carried out in part through the use of a video tape cassette on the back of a truck. The tape is frequently stopped for comments, questions, and interaction of the audience. Each tape has 10 questions to stimulate interaction and four different tapes have thus far been prepared. One of them includes demonstration of how to cook the various weaning foods, since if they are overcooked and become too thick the children will not eat them.

Growth charts are kept by the mother for all of the children. Their weights are obtained by subtraction, with the mother weighed with and without her child. Each mother is tested for her ability to interpret the weight chart. Mothers are taught to dry and pound soybeans in order to make soybean milk in their own homes. Nutrition education in the schools includes school

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children presenting nutrition information to others in their group in an active learning process. Workers realize that they must tell the same thing over and over again despite the functional literacy that approaches 80%.

4. "VTR" Project with Coca Cola and Rotary Club Support

This is a well-designed and ambitious project conducted in 24 villages in three districts in Ubon and another 24 villages in three districts in Sri Sa Ket with a total population of over 30,000 involved. The design is a simple Latin square with one fourth of the villages each having video tape education (nutrition education), radio nutrition education, both videotape and radio, or neither. It is this project that is the source of the videotapes and techniques used in some of the other projects. It has a field operations group for immediate dissemination, project dissemination, and for the collection of baseline data and ongoing evaluation. A small district weaning food plant has two electric grinders, one for soy and one for other ingredients, a rotary roaster with a gas flame, a filling machine, and a sealing machine.

This plant was visited and the operation discussed in detail. The raw materials being processed at present are mung bean, sesame, and rice. They have found that 48 hours of fumigation are essential for adequate shelf-life. If there is no fumigation, the shelf life is less than one month. It is at least one and a half months after fumigation. Roasting temperatures are about 110 C. Rice is roasted for about 15 minutes, sesame about 50 minutes and mung beans and groundnuts about 60 minutes. The groundnuts are inspected first and moldy kernels removed and burned. All ingredients are inspected on a screen and brushed to get out the fine dirt, stones and other debris. At the present time, the plastic bags containing 100 grams of the weaning food are sold for 1.75 B. to village health communicators, village kitchens, midwives and others. Their production capacity is 1400 packages per day by 3 people.

Instead of the printing of labels on the packets as is usual, an inexpensive plastic bag is filled, the label inserted, and then the bag sealed with a foot operated heat sealer. Within this larger plastic bag with the label, the three ingredients are packaged separately in smaller plastic bags to facilitate nutrition education. There is no objective evidence that this is worthwhile.

The smaller bags are sent to the villages in either a large plastic bag costing 80 stang (.8B), or the health communicator has a tin costing 12 B. that will hold 100 packages. The product is given a pork, ginger or vanilla flavor; the latter flavor costs 0.25 B. per 100 grams, while for the former two it costs 0.7 B. All products are sold at the same price regardless of their cost.

INMU is comparing the effectiveness of a plant of this type at the district level with village manufacture or intermediate-sized production at the province level. In addition, they are comparing programs that depend exclusively on purchase with those that require parents to bring in ingredients in exchange for the package. They are also comparing this approach and the purchased package approach with the preparation of a weaning food exclusively in the home.

They estimate that the packaging and labeling costs in this plant are 10 St with ingredient costs 85 St. of which 24 St. is for the addition of sugar. They estimate their cost at 1.84 B. per pack, or about 8.4 cents U.S. This does not, however, include distribution and accounting costs. Costs for village level preparation are much less. The fine cotton bags for a product that can be cooked in the family pot cost .50 St. each, but a satisfactory cheesecloth bag for the coarser product for older children costs half as much. The roaster costs 5,000 B., the filler 1,200 B., the grinder for dry seed 2,300 B. and that for oily seed 2,700 B. White rice at the present time is 480 B. for

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99 kilo and brown rice 370 B.

I saw a demonstration of the video van interactive nutrition education in Tung-Kuh-No in Muang district of Ubon province and was very much impressed by the quality and appropriateness of the material on the tape, the obvious interest and attentiveness of the villagers, and their reactions to the questions whenever the tape was stopped. Interaction was clearly occurring and the tape appeared to put across its message of the significance of a falloff in growth, the importance of maintaining the weight chart and the appropriate remedial action should growth begin to falter. This project should yield valuable information.

5. Rasri Sa Lai District Program

This is one of the projects initiated by a local district health officer with support from the Belgian EEC fund and the Teledeson Foundation. It is based in the Rasri Sa Lai district hospital which has a separate malnutrition ward for the rehabilitation of third degree malnutrition. We find the latter nearly always to be associated with a social problem, such as poverty, broken homes, alcoholism etc. that the hospital cannot solve. Of the 89 beds about 20 are devoted to children, not counting the five in the malnutrition ward. The laboratory does simple parasitology and hematology, but has no facilities for bacteriology. In order to take maximum advantage of limited staff, men and women are not segregated in the large single open ward.

The district health officer who is director of the hospital believes passionately in the Thai concept of primary health care, including nutrition. He says that he has now contacted every village with a health volunteer to set up a system of health volunteer and health communicators. There are now 57 villages with successful health cooperatives out of 102. At least 50% of the population of a village must join the health cooperative to start. Some reach 100 percent

participation. Forty-five of the villages now have 70 percent or greater participation in the health cooperative. This is the threshold that will trigger the Ministry of Health funding support. All of this has come about in two years.

The primary health care team that organizes these villages is made up of a sanitarian, a nutritionist, and an agriculturalist. They emphasize self-reliance, appropriate technology and low-cost food production in the village. In this district, the health communicators are trained in the village for one week by the district team. The health volunteer receives an additional two weeks training in the hospital and then is brought back for a 10-day refresher course every year plus a three-day special course for tuberculosis control.

The district health officer, Dr. Sanguan Nitayarumphong, is a former student of Dr. Aree's. He accompanied us to the villages of Ban Po and Ban Clikling. In the first, the health volunteer was a respected elder who volunteered after visiting another village with an active program. He saw the developments in that community, including a rice bank, and returned and discussed it with the head man in his own community. Then they formed a village health cooperative. Dr. Sanguan believes that it is better if they don't have to go in to motivate a village initially. In this village they collected 10B. from each villager for an initial revolving fund of 2,400 B. After one year the nutrition cooperative was formed. In theory, these co-ops can do anything that they wish, including set up a rice bank, a toilet co-op, a credit union, etc.

6. Tambon Na-torn, Dhatpanom District (Nakornpanom Province)

This is another project initiated by a district health officer with Ministry of Health approval. His description of the project is as follows:

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"A workshop for lactating and fertility-age women in Chatpanom district, Nakornpanom Province was set up as a community-preparation activity for implementing nutrition programs. Tambon Natorn was selected as a pilot subdistrict for the program, based on its distance from the hospital, the enthusiasm of the villagers and health workers, and socioeconomic status of the villagers.

Several meetings were arranged that included teachers, youth-leaders, farmer leaders, monks, members of subdistrict council, agricultural extension officer and the community development worker. Then subcommittees were elected for the program, which included production, distribution and administration.

The first phase of the program was soybean milk for the students in the local school and weaning food production for the preschool children, using a hand grinder and the standard formulas developed by INMU. The production took place in the local school under the leadership of the home economics and agricultural teachers. The weaning food products were sold by the monks in 4 temples and in the health center. This covers 3 villages. The price was 5B. per package (350 gm.)

The second phase transfers responsibility from the school to the Tambon council, the local temple (monks) or the youth group. This should happen after the program is firmly established.

If the program is successful, it will be one of the models for implementing nutritional intervention programs based on the rationale of self-reliance, appropriate technology and community participation."

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The nutrition co-op in this village is preparing a weaning food of rice, mung bean and sesame. They produce 200 packages per day and distribute it along with the medicines. The following value of the medicines was noted:

February	476 B.
March	648 B.
April	753 B.
May	832 B.
June	814 B.

The proportions for the weaning food in this village are 6 1/2 parts rice, 2 1/2 mung bean and 1 of sesame to be mixed with boiling water with added sugar. They begin complementary feeding at about 5 months. There are no infant formulae in this village and no feeding bottles. Most of the production in this village is sold through the store in the district hospital as is the residue product from the soy milk.

This residue is processed by combining 5 kilos of soy residue with two pounds of sugar, 1 1/2 tsp. of salt, 1 T. of pepper, and a piece of garlic. It is mixed, steamed, cut into strips, sun dried and sold for deep fat frying. This product, which contains about half of the original soy protein, sells for 40 B. per kilo. The estimated cost is 24 B. per Kg. This is a new, not a traditional product. Every village making soy milk for selling can make additional money for the nutrition co-op.

The health volunteer in this village is impressive, since he describes the primary health care program in essentially the same terms as the Director of Health Services, the District Health Officer, and the Minister of Health, using a flip chart to explain his duties. He emphasizes that these are:

- 1) to organize the health cooperative
- 2) to promote the development and use of latrines
- 3) to contribute to general village development
- 4) to show the population how to use drugs

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- 5) to weigh the children
 - 6) to share in the village culture as a member of the subdistrict culture committee
 - 7) to serve as president of the village agricultural cooperative
 - 8) to motivate the nutritional cooperative.

There is a flourishing nutrition co-op in this village with two grinders operating simultaneously for the daily production. They produce a soy and mung bean mixture with added sugar, salt and garlic. They also make a soy bean milk for consumption in the village and they send 1,000 packages a week of weaning food for sale to the district hospital. Sales within the village are not as impressive. They average only about two packages per day. This may be because the cooperative has only been going for one month, and has been concentrating on earning more capital through cash sales to the district hospital.

Clearly, the production of the weaning food, which is done by co-op members in rotation, is a great social occasion. There are 109 households in the nutrition cooperative with 331 shares outstanding at 20B. per share. New members are said to be joining every day. Profits of the cooperative are being spent to establish a co-op store stocking staple foods. There are 23 village health communicators in this village of 224 households with 2018 people, of whom 58 are less than one year of age, and 111 one to five years old. They estimate that the profit on drug sales is about 30% but the profit on the weaning food mixture is only about 2%. These are figures which I suspect have little meaning.

7. World Bank - Ministry of Health Project

This project is the one that involves 30 villages in each of three provinces - Ubon, Udon and Darat - and includes villages with electricity for which electric grinders have been supplied by UNICEF and villages without

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electricity that utilize manual grinders. It is this program that is to be expanded by the funds from USAID and funds of the Ministry of Health itself. The villages in this program will have all of the components of primary health care - Thai style, as described above. Particular focus is on health cooperatives, nutrition cooperatives (including weighing and village prepared weaning foods) income generation and improved food production.

Enough differences will arise, however, in the way these programs are implemented, in the timing of the various components, and in other features introduced by the individual district health officers responsible, that there will be a great deal to be learned from an ongoing evaluation of the effects of these differences. For this to occur, however, it will be necessary to recognize and record the differences and provide for some ongoing quantitative criteria of efficacy and actually carry out the comparative evaluation.

8. USAID - Ministry of Health Project for "Extended Rural Primary Health Care Expansion"

This project of the Ministry of Public Health, financed by USAID/Thailand is the one designed to improve the nutritional status of infants, preschool children and mothers in 1,200 additional villages. The specific goals are to eradicate all third degree malnutrition, to decrease the second degree malnutrition from 14 to 7%, to reorient health administrators/planners at middle level for their new roles in health development and to increase their capability for intersectorial planning, to support the primary health care program, and to establish systems whereby the training that is now experimental can be institutionalized.

The description of the project states:

"In 1,200 of the poorest villages in Thailand, village health workers-

ten to a village - will stress the promotion of breastfeeding with warnings against the premature introduction of low calorie foods - a common Thai practice that exacerbates malnutrition. Village Health Communicators (VHC's) will weigh every child under five once a month and will show mothers how to plot the progress of their children on "road to health" charts which will be kept by the mothers. Village Health Volunteers (VHV's) will treat infant diarrheas with oral rehydration salts and will refer mothers and children to rural health stations for immunizations. Village development committees will distribute seeds to grow legumes and nuts needed to prepare supplemental food mixtures rich in calories and protein. Agricultural extension and home economics agents - who will have been cross-trained by the MOPH Nutrition Division - will promote the introduction of these crops and the raising of poultry and fish. Tambon health workers, community development workers, school teachers, and agricultural extension agents will lead demonstration sessions in each village and will help the village councils to plan for the local production of supplementary foods.

Mothers will participate in weekly get-togethers to prepare supplemental foods by roasting, grinding and packaging the particular combination of rice, legumes and nuts available in a given community. The children of mothers who attend these communal demonstration and production sessions will be fed pabulum made from the dry mixtures. The small number of mothers whose children suffer from third degree malnutrition (2% of the children under five) will receive the supplemental food mix at no cost, and others will receive it in exchange for small contributions in cash or kind to cover the cost of the ingredients, typically one Baht per day per child.

Growth charts will serve key roles in the project. On the one hand they will function as educational and motivational stimuli for the mothers.

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On the other they will supply the data for monitoring progress at all levels - village, district, provincial and national. The health volunteers and village committees will record growth data and other vital indicators - birthweight, child and maternal mortality, cases of acute diarrhea, etc. - for collection by Tambon and district health staff and submission to the province.

In addition to nutrition activities, the village headman, VHV's, VHC's, TBAs, contact farmers, youth group and mothers' group will be trained and involved in MCH services in order to promote the health status of pregnant women, lactating mothers and infants/children. The nutrition and MCH activities as well as immunization programs will be integrated at the community level in order that a pregnant woman will be in good health, delivering a healthy baby and taking good care of her baby.

The management training activities are in addition and will use the largest proportion of the proposed funding. These will be carried out chiefly through a series of five-day training workshops or courses. Funds are also provided for observation trips for village council members to other project sites and for monitoring the workshops. Nonexpendible commodities will include beam scales and child harnesses, spring scales for pregnant women, food scales for measuring ingredients of supplementary foods, hand grinders, and utensils for preparing supplementary foods for each of 1,200 villages.

The project will establish an evaluation system on an ongoing basis so that the personnel involved at all levels can monitor changes and activity outputs, nutritional status of children (based on the weight/age chart and birth weight), nutrition and child care practice of the parents, high protein food production, supplemental food processing and distribution, acreage of land used for growing legumes and nuts, community participation, coordination

among different sectors at different levels, variation of approaches in nutrition and MCH activities in different villages, establishment of village nutrition/health revolving funds and other relevant indicators of project activities.

The project will finance purchase of equipment necessary to process the evaluation data, to train personnel and to develop the analytical programs required to translate the data into meaningful terms for project management decisions. Although much of this can be carried out by local staff, particularly those from INMU, outside consultants are also desired to help assure objectivity. The initial activities for this project expansion are already under way.

III. Health Activities - the Medical Cooperatives

INMU was responsible to the National Economic and Social Development Board for a document on previous experiences, problems, patterns and suggestions for the medical cooperative program to be carried out at the village level by the village health volunteer (VHV) with the assistance of the village health communicators (VHC). Eighty-five to 90 percent of the illnesses occurring among the rural poor can be alleviated or cured by simple treatment. However, this is not available in villages where the health center does not exist and villages simply buy drugs that are widely promoted. The result is that they spend more money on unnecessary treatments that mostly effect adversely both their health and economic status.

When villagers go to district or provincial hospitals when they are sick, the transportation costs are often more than the drug treatment itself. A survey showed that in April, 1981, 54% of health service workers and 24% of doctors at the district recognize the value of medical cooperatives

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within the villages to dispense simple medicines. The idea of providing essential drugs to villagers was first introduced at Mork Jun Pae village of Muereng district, Mo Hong Sorn Province. It was an unqualified success. All 157 households participated and became members of the cooperative sharing two B. per month (24 B. per year) for membership. The villagers bought drugs from the government pharmaceutical organization, prepared the drugs and sold them in the village. Initially this was the function of the VHV but later on elected villagers carried on the work. By 1981 nearly all the provinces throughout the country were implementing this program using the model from Mae Hong Sorn Province and from other similar programs developed more recently.

It is considered that the medical cooperative project should have the following benefits for the community:

- 1) essential drugs available for treatment and eradication of disease in the acute stage
- 2) saving of time and money of the villagers by reducing the need of going to district or provincial hospitals
- 3) providing knowledge of drugs and their safe usage
- 4) stimulating the villagers to participate in other aspects of primary health care
- 5) allowing the VHC/VHV to exercise full responsibility and make their jobs self-rewarding
- 6) providing better service of patient referrals to the hospitals

The main objective of the medical cooperative project is to provide essential drugs for the community, but successful community participation leads to additional activities contributory to primary health care and community development. The drug sellers, usually VHC/VHVs, must receive a training

program that consists of simple drug treatment and procedures and first aid management. While training emphasizes drug uses, especially simple medication of local diseases and the hazards of abused and overdosed drugs, the training session also includes disease prevention, nutrition, mother and child health, and other aspects of primary health care. After initial training, one to two additional training sessions per year are programmed for refreshment of knowledge.

Essential drugs are limited to:

- | | |
|---------------------------|-----------------------------------|
| Analgesics & Antipyretics | Carminatives |
| Cold Remedies | Stomach Mixture |
| Cough Remedies | Laxatives |
| Antacids | Calamine Lotions |
| Multi vitamins | Eye Drops |
| Ferrous sulfate Tablets | Ear Drops |
| Stomachache Remedies | Anthelmintics |
| Tranquilizers & Hypnotics | Antibiotics: Sulfa and penicillin |

The district and provincial health officers are responsible for providing adequate and inexpensive drugs for the medical cooperative. In general, the medical cooperatives are expected to make a 30% profit selling the drugs and still sell them at much lower than the market price. How the profit is to be utilized is determined by the share holders. One recommendation is 30% to the drug sellers, 30% to the fund for the village health programs, and the rest to the share holders. Some cooperatives, however, apparently invest most of their profits in other health-related activities.

While the medical cooperative projects depend upon the participation of the villagers themselves, support from government personnel, including midwives, district officers, district health officers, district hospital

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doctors, provincial health officials and community development officers is important. Proper referral of patients from village health centers to the provincial hospitals can make the project more effective and encourage participation.

Continuing evaluation of the medical cooperatives is necessary in order to check drug accounts and solve problems. This is done by having the person responsible for drug delivery report to the district hospital director or district health officer, depending on who is responsible for the project and having a mobile clinic doctor visit the village every one to two months.

The project will be initially implemented in 30% of the total villages, gradually increasing to 20 villages per district. The combined AID-Ministry of Health target for 1982 is a participation of 1,476 villages in 246 districts, increasing to 3,444 by 1984. Experience with the health cooperative that responds to the community's greatest felt need paves the way for other community activity such as the nutrition cooperative, the rice cooperative, the fertilizer cooperative and the pesticide cooperative. In fact, in one of the villages I visited the VHV was also head of the agricultural cooperative and involved in the formation of the nutrition cooperative.

IV. Rural Poverty Eradication Program

This project, too, originates with the National Economic and Social Development Board, and the Primary Health Care and Nutrition programs are a part of it. It has its origins in the fact that despite impressive economic development over the past twenty years (7-8% annually), the agricultural income per capita is 4 to 10 times lower than that of any other sectors and data collected over the period covered by the national development plan of 1960-77 point to widening disparities in per capita income. Plans for the

development of poor rural areas in the fifth national development plan are therefore formulated under a new and different concept.

In principle, the country's output and income will not be highlighted, but emphasis will be placed on human need, i.e. the needs of the poor population who live in rural areas that have missed out on development benefits available so far. It will promote such village activities as fisheries, water sources, animals for food, buffalo banks and a multiple purpose rural development project under a Japanese loan program.

Its infrastructural services include the upgrading of district hospitals, primary health care services, nutrition programs, agricultural credit, school books and portable water supply. The production program will be concerned with the nutritious foods, highland rice farming, soil improvements, and use of saline soils in the Northeast. The program has been established for the period 1982-1986. The 1982 budget is 622 million B. and for the five years 1982-1986, 2,195 million B.

V. Maternal Health Activities

The weighing of women during pregnancy is intended to be a new and integral part of the primary health care program. Although most villages currently lack the necessary scales for weighing adults, they are to be provided in the future. INMU has been exploring the expansion of its projects to develop village formulated weaning foods to include supplementary foods for Thai pregnant women.

The first formula tested consists of the following by weight in grams:

Soybean	20
Mung bean	30
Sesame	10
Sugar	30
Water	20

The other contains by weight in grams:

groundnut	25
sugar	10
rice	15
vegetable oil	5
dried shrimp	10
water	5

The total weight of the former is 100 grams and that of the latter, 70 grams. For the first formula, sesame is roasted 2 to 5 minutes, the groundnut 15 to 20 minutes and the legumes 19 to 15 minutes before weighing, mixing, grinding and the addition of melted sugar. In the second formula, the rice is dried in an oven for 20 minutes at 250 degrees C. or exposed to sunlight for 3 to 4 hours. The groundnut is roasted for 15 to 20 minutes and the dried shrimp is untreated. The rice is also fried in oil for a half second before mixing. This formula is simply mixed, and melted sugar stirred in without grinding.

The experimental population was composed of women aged 16 to 30 years who attended the antenatal care clinic and whose gestational age at the start was 20 weeks plus or minus two weeks. The first formula provided 384 calories and 15 grams of protein per day and the second formula, 348 kilocalories and 13 grams of protein per day. Supplementary foods were given to the mothers at the beginning and thereafter for every two weeks until the completion of the study.

Body weight, mid-arm circumference, triceps skin fold and verification of the intake of supplementary foods were also measured every two weeks. Dietary intakes were collected three times during the study while hematocrit was determined at the beginning and the time of delivery. Measurement of the pro-

duct of conception including birth weight, length, head and chest circumference of the newborn and placenta weight were done.

The overall results suggest that among malnourished mothers supplementation of protein and energy in this manner during the last trimester had significant effects on maternal weight gain, birth weight of the newborn and placental weight, even though the daily intake of supplementary foods reduced significantly as the end of the pregnancy approached. Maternal weight gain, mid-arm circumference, birth weight of the newborn, placental weight were all significantly higher in the supplemented groups than in the controls. This study is being cited to encourage the incorporation of a maternal supplementation component into the primary health care program.

VI. Other Research Programs of INMU

1. Energy Consumption of Pregnant Women

With the support of the Nestle Foundation INMU started a study in February of the physical activity and energy consumption of pregnant women, as part of global studies coordinated by John Durnin of Glasgow. The project includes five measurements every six weeks during the last trimester of pregnancy. These include: basal metabolic rate, time and motion studies, oxygen consumption and CO₂ in expired air with various activities, anthropometry and oxygen consumption on a submaximal treadmill test at 3 mph. The project is intended to run for three years and is managed by K llaya.

2. Functional Consequences of Iron Deficiency

With United Nations University support, the same treadmill and facilities will be used for submaximal tests on non-pregnant women in the same population before and after iron supplementation. Measurements will be oxygen consumption, CO₂ production and pulse rate at rest and during submaximal exercise on the treadmill. A battery of immunological tests will also be performed before and after supplementation. Women selected for this study will be divided equally among three groups on the basis of immunological status.

- A. Iron deficient and anemic
- B. Iron deficient and non-anemic
- C. No iron-deficiency, non-anemic

The physical capacity part of the study will be supervised by Kallaya and the immunological and hematological studies by Vichai.

VII. Population Planning

USAID's initial support for population planning in Thailand began shortly after the establishment of the National Family planning program in 1970.

During the first 5 year project USAID financed all contraceptives, participant training, technical assistance, and medical kits to a total of 8.3 billion dollars. Because of the disappointment with the first several years of the NFPP performance, the government of Thailand strengthened its commitment and obtained USAID support for expansion of services in rural areas. This included:

- 1) voluntary surgical contraception (VSC)
- 2) the creation of additional village level sources of family planning information and supplies
- 3) increased conception choices and the introduction of new contraceptive technologies including injectables and mini-laporotomy. Total funding for this project that will be completed in 1982 is 16.5 million dollars from AID and 23 million from Thai government sources.

The new goal is to reduce the annual population growth to 1.5 percent by 1986, mainly by extending and improving existing programs. This does not require any increase over the rate at which acceptors were recruited in 1979 and in 1980 and it appears that the growth rate is already below 2%. Optimism is further supported by the finding of a recent study of fertility trends and determinates in Thailand, that shows total fertility rate to have continued its decade long decline from 6.12 in 1970 to 3.55 in 1979. Nationally, the percentage of married women age 15-44 who are currently pregnant has fallen from 15.3 in 1970 to less than 10 in 1979. All agree, however, that the goal will require sizeable increases in budget support and an even greater effort to keep policy makers well informed about population related matters and to engage them fully in the policy-making process.

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VIII. Proposed Asian Regional Workshop on Effective Communications in
Community Education for Nutrition and Primary Health Care.

This workshop is being jointly planned by INMU with industrial support and UNU. Enormous resources will be devoted to expanding primary health care by international and bilateral agencies in government in the next two decades, but there is no assurance that nutrition communication and education will be effectively incorporated into such programs since they have rarely been successful components of them in the past. Functional illiteracy, lack of infrastructure, expensive technology and other development techniques have made communication efforts in nutrition and health at the community level minimal, difficult, and disappointing. Some progress in overcoming these constraints is now being made, as for example, the use of videotape in interactive nutrition education at the village level.

The proposed workshop will examine the state-of-the-art of effective communication for nutrition and health care at the community level. It will attempt to assess the status of community nutrition education and communications with current programs of primary health care within each country of the region. It will review successes and limitations of projects and programs currently being implemented in Asia, and the latest international developments in techniques and a broad spectrum of technologies that can be applied in Asia.

The workshop is now scheduled to be convened in Bangkok May 16 to 20, 1983. Participants will be policy makers and planners in nutrition and primary health care, especially those concerned with the implementation of communication and education programs, and internationally recognized experts in primary health care, communications for behavioral change, media applications, low budget- high impact advertising for public service and planning and project evaluation. A publication is expected to emerge from the workshop.

IX. Potential Use of the Winged Bean

In surveying the weaning food program, I was asked to evaluate the potential for using the winged bean as a component of village base' weaning foods. The winged bean is a climbing, herbaceous perennial with individual pods containing five to twenty seeds that can be harvested as a green vegetable early in the first stage and gathered in the second stage and shelled to yield soft green unripe seeds, or after the pod has dried, harvested for the hard, mature seeds. The winged bean has traditionally been cultivated between latitudes of 20 North (Bangladesh, Northern Thailand and Northern Burma) and 10 degrees South (Melanesia and Comoro Islands). It thrives in hot, humid areas with 2500 mm. or more of annual rainfall.

It also displays drought-tolerance. In 1979, Thailand had its worst drought in history. Cornfields died but winged bean fields survived, although the plants flowered poorly. Yields are comparatively high, with the mature dry seeds comparable to soybeans and peanuts. The seeds can be steamed, boiled, fried, roasted, fermented or made into milk, tofu or tempe. Nevertheless, pods are the most popular part of the plant in most countries where the winged bean is grown, including Thailand. The young, tender pods are eaten raw, sliced or chopped and used in salads, soups, stews and curries.

There is no reason why the mature seeds could not be used in Thailand in weaning foods, except that it would require the introduction of a new custom. Moreover, the seeds are not readily available and farmers producing winged beans for sale have difficulty finding a market. In the villages I visited it is eaten only occasionally and not popular. Traditionally, people don't really like it. Other similar grains are considered easier to grow and better liked. If varieties can be improved, and good seed can be made available on a regular basis, and its nutritional value better publicized, there should be an opportunity to experiment with its use in some villages.

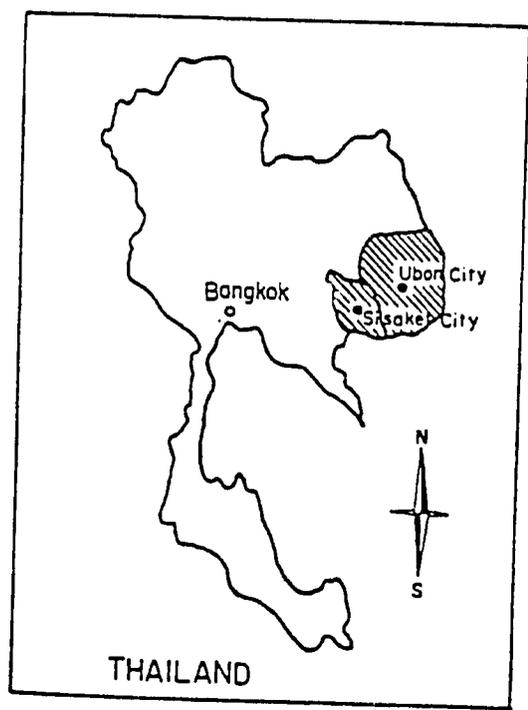
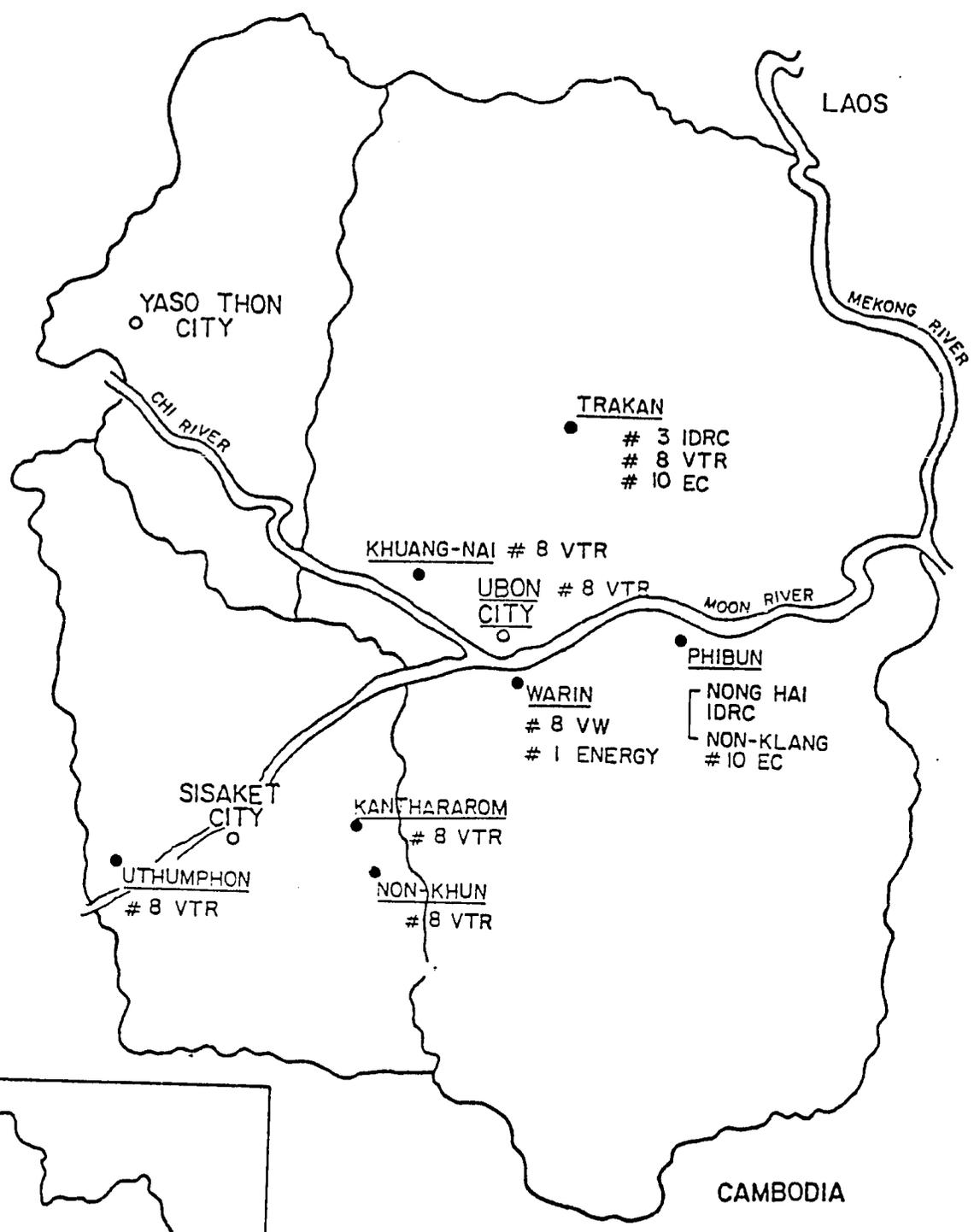
Cowpeas are another dry season crop in the semi-arid localities of the northeast that could be used in the village based weaning mixtures.

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Table 1. Ingredients and Composition of Supplementary Food Formulas

<u>Formula</u>	<u>Ingredients</u>	<u>Composition per 100 g.</u>		
		protein (g)	fat (g)	energy (kcal)
I	Rice, Soybeans, ground nuts (70-15-15)	16.5	10.6	437
II	Rice, Soybeans, Sesame (70-15-15)	14.8	11.0	448
III	Rice, Mung Beans, ground nuts (60-15-20)	14.5	11.9	443
IV	Rice, Mung Beans, Sesame (60-20-15)	13.2	13.2	451
V	Rice, Fish meal, ground nuts (70-10-20)	18.5	11.8	454
VI	Rice, Fish meal, Sesame (70-10-15)	17.2	10.4	444
VII	Rice, Fish meal, oil	14.4	9.2	437

MAP OF THE SELECTED VILLAGES IN UBON & SISAKET PROVINCE



THAILAND

Documents Consulted:

1. Project Paper Thailand: Population Planning II, USAID, May, 1982.
2. Nutrition for the Growing Child and Family Health, Report of an implementation Program for Improving the Nutrition Status of the Rural Poor in Northeast Thailand, Sakorn Dhanamitta, Kraisd Tontisirin, Aree Valyasevi, 1982.
3. Implementation of a Conceptual Scheme for Improving the Nutritional Status of the Rural Poor in Thailand, IBID, 1982.
4. Community Development Project, (Progress Report) Aug. 1980- July, 1981. Aree Valyasevi, Sakorn Dhanamitta, Bangkok, Thailand.
5. Formulation of Supplementary Infant Foods at the Home and Village Level in Thailand, Kraisd Tontisirin, et.al. Food and Nutrition Bulletin, Vol.3 No.3 July 1981.
6. "First Progress Report," Nutrition Education by Video Tape Recorder to Promote Proper Supplementary Feeding, April, 1982. INMU.
7. "Progress Report," Integrated Health, Nutrition and Rural Development.
8. Nutrition/MCH Activities and Management Training under the Extended Rural Primary Health Care Expansion Project, June 1982-April 1983, Ministry of Public Health and USAID/Thailand, Revised, June 1982.
9. "Drug Co-op Project," Medical Cooperative Project, Kraisd Tontisirin, Yongyutrajornpadungkitti. 1981.
10. "Concept of Primary Health Care, Thailand," Amorn Nondasuta, 1981.
11. "Rural Poverty Eradication Programme," National Economic and Social Development Board, 1981.
12. The Winged Bean A High-Protein Crop for the Tropics National Academy Press, Washington D.C., 1981.
13. Formulation and Evaluation of Supplementary Foods for Thai Pregnant Women. Utumporn Booranasubkajorn, M.S. Thesis, Mahidol University, 1981.
14. "Malnutrition as a Social Indicator: Nutrition Problems in Thailand" Kraisd Tontisirin, Pattanee Winichagoon, Research Project under the Thai University Research Association. 1982.
15. "Home and Village Prepared Weaning Foods Project," Aree Valyasevi, Sakorn Dhanamitta, Visith Javasi, presented at the Workshop to Draft Weaning Foods Project Guidelines, MIT, Cambridge, Mass. June, 1982.