

HEALTH AND NUTRITIONAL PROBLEMS IN THE NAM PONG WATER RESOURCE DEVELOPMENT SCHEME

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INTRODUCTION

In view of the possibly serious problems of water resource development schemes on health of the people, a number of investigations had been undertaken in Thailand (Sornmani *et al.*, 1973; Migasena *et al.*, 1974; Harinasuta *et al.*, 1976). A study on health and nutritional problems in the Nam Pong water resource development scheme had been started since 1977.

Area and population

The Nam Pong resource development project is located in Khon Kaen province, about 500 km northeast of Bangkok. The scheme consists of the Ubol Ratana Dam, which was completed in 1966; the Nam Pong lake with a total surface area of 250 km² and a total storage capacity of 2,560 million m³, the Nong Wai irrigation area and a resettlement area.

Along the shore of the lake there are about 60 fishermen villages. The fish caught are mainly sold but a reasonable amount is eaten. In addition to fishing, farming also takes place and the main crop is rice. From the Nong Wai diversion dam, irrigation channels supply the Nong Wai irrigation area with water. The irrigation area covers approximately 13,500 hectares with 3,500 farm units in 33 villages. The main crops are rice, vegetables and fruits.

The resettlement villages are mostly inhabited by persons whose original homes were flooded by the lake waters and who have

now been moved to areas where the forest had been cleared. The crops include kapok, corn, tapioca, rice, sugar cane and mulberry trees for silk worm cultivation.

The traditional villages rely on rain-fed fields from the cultivation of rice, vegetable, jute, cassava, tobacco and mulberry trees.

The climate in the whole area under study varies through the year from a hot season in March through April or May, to a rainy season between June and October and a relatively cold season from November through to February. Rice is harvested after the cold season. Some villages in the irrigation area have a second rice crop a year.

The annual gross income per household had been assessed. In the irrigation area it was calculated to be 1,008\$US around the lake 753, in the resettlement 524 and in the traditional villages 398. Obviously irrigation had offered the population a better socio-economic status, with an income almost three times that in the non-irrigated area (Suetrong *et al.*, 1979).

Approximately 22% of the total population of 12,225 persons of all the selected villages were included in the survey. Six villages around the lake with 129 households consisting of 756 persons, 7 villages in the irrigation area with 208 households and 1,260 persons, 3 resettlement villages with 70 households and 431 persons and 2 traditional villages with 142 households and 736 persons were selected in a two-stage random sample design. The first stage was based on the

number of villages and the second on the number of households.

Health Status

The history of illness was taken from each family by questioning usually the father or the mother about illness in the family. The most common complaints reported throughout all the areas involved the gastro-intestinal tract.

The parasitological study included all the age groups of the sampled population. Stool samples were examined by the direct smear method and Stoll method (Stoll, 1923).

Second stool samples were collected from subjects who showed hookworm eggs; these were cultured in order to identify the species of hookworm, using the polyethylene tube culture according to Sasa *et al.*, (1974).

The lowest prevalence of parasite infection with 41.5% was found in the lake shore villages, compared with the other areas, where prevalence rates varied between 47.5% and 50%, without significant difference (Sornmani *et al.*, 1981).

Quite a number of different intestinal parasites had been identified. The most interesting results however had been with *Opisthorchis viverrini* and hookworm. It had been assumed prior to this study that a particular high prevalence of *O. viverrini* should be found around the lake because of large quantity of *Bithynia* water snails and cyprinoid fresh water fish, in the water, serving as intermediate hosts.

However, the highest prevalence rate of *Opisthorchis viverrini* had been found in the irrigation area and the lowest in the lake side villages. Most probably there is some sort of "dilution" effect for the lake and "concentration" effect for the irrigation area, where the people live in closer vicinity to the

water canals and ditches as around the lake. *Necator americanus* was the only species of hookworm recognized. The intensity of infection for both *N. americanus* and *Opisthorchis* was low.

Besides the prevalence of parasites, the prevalence of anaemia have been determined. A 12 gm/100 ml haemoglobin concentration was chosen as the cut-off point for the assessment of anaemia. On this basis approximately 30% of all adults of both sexes were classified as anaemic, 5.5% to 8.9% had values below 10 gm/100 ml. Severe anaemia (under 6 gm/100 ml) was found only occasionally, in ten cases out of 1,126 persons examined.

Children in the traditional villages were generally more anaemic than those in the other areas, although the numbers examined were small. Choosing 10 gm/100 ml as the cut-off point the rate of anaemia in children varied between 8.2 and 36.6 % in the four study areas.

Nutritional status

It had been expected that an improvement of the economic status will be reflected by the nutritional status of the population. The nutritional status usually is measured within a population group most vulnerable to nutritional deficiencies. These are preschool children. Therefore approximately 90 % of all preschool children in the study area had been surveyed, by means of anthropometric measurements. The weight and height of each child were taken and the age recorded according to the birth certificate. The SD scores of height for age and weight for height were calculated according to the suggestion of Waterlow *et al.*, (1977). Using the reference data from the US National Center for Health Statistics (1976).

It has been suggested by Waterlow to term a deficit in height for age as "stunting"

and a deficit in weight for height as "wasting" (Waterlow, 1973).

The cut-off point below which a child is considered to be wasting should be -2.00 SD weight for height. The comparison of the Thai standard compared with the North American standard indicated that the cut-off point for stunting should be -3.00 SD height for age. Wasting is considered to be the result of an acute nutritional disorder whereas stunting would indicate a chronic or past condition of malnourishment.

There was no significant difference between the areas regarding "wasting" children. There were fewer stunted children in the irrigation area (7 %) than in the lake shore (14.5 %) and the resettlement area (19.8 %). Only 1.6 % of all children were found to be wasting and stunted. The age pattern of undernutrition in the irrigation area however was significantly different from that in the lake shore area (Egormaiphol *et al.*, 1980).

Wasting was found in children between the age of 6 and 35 months with a high prevalence from 12 to 24 months in the lake side area. In the following age group (24 to 35 months) there was a steep increase from 5.1 % to 20.8 % in the number of children which was only reduced to 15.1 % up to the age group 48 to 60 months (Schelp *et al.*, 1981).

In the irrigation villages there was a similar steep increase in wasting after 12 months of age but the number of undernourished children remains relatively high throughout the preschool age. The distinctly high prevalence of wasting in 1 to 2 years old children compared with other age groups seems to be a common phenomenon and had been observed in Panama, Philippines and Togo (Keller *et al.*, 1976).

This may be attributed to insufficient supplementary feeding during weaning and

immediately after, to an increased exposure to intestinal and respiratory infections, or to a combination of both. It might be speculated that these events are causing growth retardation in the following years but do not disturb the body's proportion of weight for height. The age distribution of undernourishment does not follow this "traditional" pattern in the irrigation area.

There is no easy explanation for the observed differences between villages in the irrigation area and around the lake. According to observations about the life style of the population in the area, the villagers around the lake have time to care for their children, with only the father engaged in fishing during the night time. Irrigation has led to labour intensive forms of horticulture and agriculture, involving the participation of the women and older children. This may have resulted in a changed life style with different meal patterns and with little free time for child care and child feeding.

This study demonstrate that improvement of the socio-economic environment does not necessarily result in the improvement of health of the community.

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