INVESTIGATIONS ON NUTRITIONAL ANEMIA OF THE FARMERS IN NORTH-EASTERN PART OF THAILAND

PART 1

DIETARY SURVEY

by

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PREFACE

In order to throw light upon the anemias that occur frequently among the farmers in Khon Kaen province in North-Eastern part of Thailand, the investigations had been carried out into the real state of the anemia from the viewpoints of dietetics and medical science and, in addition, had been inquired into environments for the background, in which real state of the anemia were originated with.

Our staffs and teams in Nagoya Women's University carried out these investigations during the term extended from June 1972 to January 1973, in cooperation with the Nutrition Division, Department of Public Health Promotion, Ministry of Public Health, Thailand.

In this part, we would like to verify and to examine on the results of surveying and having investigated on the living conditions of meals and dietaries, and of having observed the real status of nutritional ingestions and in addition, of having surveyed on the living habits of meals and dietaries, in order to solve exactly the following problematic points: i.e. How farmers' meal and dietary livings in Khon Kaen province influence upon the real situations, in which their anemia have frequently occurred in this areas.

I. SURVEY OF DIETARY INTAKE

METHODS ON SURVEYS

a) Subjects for Surveys

Seven villages had been selected out of eleven villages that had already been subjects for medical surveys and had picked out each one of six families from all families which had been subjects for medical surveys among those seven villages. And then, six families had been taken as the subjects for these dietary surveys (Table 1). And the age-group and sex-distinction of subjects for dietary surveys are shown in Table 2.

Table 1. Dietary Survey 1972

Date					Village No.	Village Name	Numbers of Surveyed Families
November	7,	8,	9,	10	1	Ban Khota	6
〃	13,	14,	15,	16	2	Ban Nonghuaua	6
〃	20,	21,	22,	23	3	Ban Khoklahm	6
〃	27,	28,	30,	Dec. 1	4	Ban Han	6
December	4,	6,	7,	8	5	Ban Topradoo	6
〃	11,	12,	13,	14	7	Ban Huabeung	6
〃	18,	19,	20,	21	10	Ban Khoksoong	6
Total	28 days				7		42

Table 2. Age Group and Sex of Subjects

Age \ Sex	Female	Male	Total
< 1	9	8	17
1 — 3	17	8	25
4 — 6	18	8	26
7 — 9	13	20	33
10 — 12	8	10	18
13 — 15	12	7	19
16 — 19	17	2	19
20 — 49	48	50	98
50 — 59	8	5	13
60 ≦	9	6	15
Total	159	124	283

b) Terms of Surveys

The surveys had been carried out on the base of the schedules in two months (i.e. from November 1972 to December 1972). And the schedule like this is shown in Table 1.

c) Dietary Surveys and Techniques of Aggregations

First of all, parties had been made up for survey. And each one of these parties had been teamed up one Japanese nutritionist and with one Thai nurse. And for the purpose of going on with this dietary surveys, each one of these parties had stayed at each one of those six families throughout the day. Furthermore, each party had made a searching inquiry into dietary problems in the course of those two days at every family. Before the meal (i.e. Before family members prepared their meals and after they had finished preparations of their meals), each party of dietary surveys had weighed the

quantities of foodstuffs and of their residuals and had kept on records of them. On the base of those records and survey-data, dietary intakes were calculated at each family and at each foodstuff. And intake of each food per person per day obtained by dividing by the number of persons and days.

However, infants who had been under one year of age, were left out of these aggregations and computing processes. Daily nutrients intake was calculated on the base of the data concerned with food intake, by referring to food composition table. This data which was named as food composition table and was mainly referred was one that was publicated by Ministry of Public Health in Thailand. Some foodstuffs that was not shown in food composition table of Thailand had been referred to table of food composition in Japan.[1] As for *Mandam* (aquatic insect), it had been referred to the values which Thailand Nutrition Division had analyzed. Reference Man Intake of each nutrient had been calculated from daily intakes for a person by referring the following formula:

$$\text{Reference Man Intake} = \frac{\text{Daily Intake for a Person}}{\text{Reference Man Ratio}}$$

Dietary allowance was based on the Table of Thailand Recommended Daily Dietary Allowance.

$$\text{Reference Man Ratio} = \frac{\text{Average Dietary Allowance for a Family}}{\text{Dietary Allowance for Reference Man}}$$

d) Folic Acid

Folic acid was measured microbiologically by using *Lactobacillus casei* ATCC 7469. Total folic acid was measured after treating foodstuffs with chicken pancreas conjugase. These results of measurements are shown in Table 3. As for the values and foodstuffs which are not shown in Table 3, the intake per day was calculated by referring to the numerical values that were already shown in studies and works of this field.[2),3),4)] And then, concerned with glutinous rice, the value of after cooking was used.

Table 3. Folic Acid Contents of Thai Foods* (μg/100g)

Food Item	Free Folate	Total Folate
Gord gourd, leaf	23.5	81.3
Gord gourd, leaf	37.5	98.0
Indian pennywort leaves	22.0	59.3
Basil (Bai grapau)	28.0	84.0
Onion (white portion)	70.0	78.7
Onion (green portion)	55.0	113.3
Onion (green portion)	60.0	120.0
Cucumber (Buab lai)	14.5	17.3
Fennel (Pakchi Lao)	35.0	133.3

Mint leaves	28.0	52.0
Pak sadau	58.0	141.3
Coriander	26.0	128.0
Galingale	4.0	16.0
Chinese cabbage	42.3	56.3
Ridge gourd	5.0	18.0
Midnight horror (Pehkah)	60.0	112.0
Plantain flower	22.0	60.7
Eggplant	20.0	26.3
Lead tree, Acacia	72.5	97.5
Pack pai	130.0	200.0
Wax gourd	5.0	14.0
Papaya, unripe	8.5	12.9
Papaya leaf	170.0	320.0
Water melon, unripe	11.0	15.0
Sesban cassia flower	140.0	152.0
Coriander (Pakchi farang)	46.8	70.0
Mustard greens	90.0	110.0
Pak siennu	48.0	70.0
Hua rusii	48.0	106.0
Yam bean	20.0	42.0
Tamarind, green	6.3	6.7
Orange	12.8	34.0
Papaya, ripe	26.5	40.0
Water melon, ripe	5.0	9.6
Pomelo, Shaddock	9.0	24.0
Hog plum	9.1	35.0
Coconut milk	4.0	15.0
Coconut meat	15.0	35.0
Fermented fish	6.3	10.0
Chrysalis	19.5	140.0
Corbicula	13.3	44.2
Mud snail	86.0	116.0
Frog	3.0	50.4
Crab (fresh water)	26.0	90.0
Fresh water catfish	5.3	61.3
Grami (fish)	9.0	24.5
Dried fish	6.3	11.7
Ordinary rice (uncooked)	8.0	39.4
Ordinary rice (boiled)	3.0	3.9
Glutinous rice (steamed)	14.0	18.7
Rice noodle (cooked)	4.0	6.7
Rice noodle, small (cooked)	2.5	8.3

* Analyzed by H. Taguchi.

RESULTS

a) Nutrient Intakes

The results that were brought about nutrient intakes in the above are shown in Table 4.

Reference Man Ratio that was calculated at every age-distinction and at every sex-distinction on the base of the data on Thailand Recommended Daily Dietary Allowance is shown in Table 5. All mean values of Reference Man Ratios in term of each village-distinction are shown in Table 6. The nutrient intakes that were calculated on the base of Reference Man Ratio are shown in Table 7. The results of comparative analyses among relative-mean-values of Reference Man Intake in term of each village-distinction, are shown in all figures (Fig. 1-1 to Fig. 1-13).

The comparative examinations between the data of recommended dietary allowance and the data of Reference Man Intake (R. M. I.), are such as follows:

The mean value of R. M. I. of calorie was 2,295 Cal, and the ratio of this intake to the recommended allowance in Thailand was 90 %.

The mean value of R.M.I. of protein was 62.2 g. And those measured values on R.M.I. of protein were larger than the Thailand recommended allowance, except for the case of village No. 2. The mean value of R.M.I. of animal protein was 16.5 g. And the intake of animal protein was rather less in this case.

The mean value of R.M.I. of calcium was 335 mg. And the ratio to the Thailand recommended allowance was set below 80 % in each case of all villages. Particularly, in the case of village No. 2, the Reference Man Intake of calcium was 53 % to Thailand recommended allowance. This was the lowest ratio in each case of all villages.

The mean value of R.M.I. of iron was 7.9 mg. And those measured values on R.M.I. of iron were larger than the allowance of Thailand in each case of all villages. But, the mean value of intake of animal iron was 1.8 mg. This was considerably set in a lower level.

The mean value of R.M.I. of vitamin A was 1,563 I.U.. So, it was recognized that the intake of vitamin A had not been enough in each case of all villages. Particularly, in two cases of villages No. 1 and No. 3, the R.M.I. of vitamin A was set below 50 % to Thailand recommended allowance. The measured value of R.M.I. of animal vitamin A was 350 I.U.. This was considerably lower level. And so, it was recognized that the quantity of vitamin A which had been ingested as "carotene" was rather larger than that of retinol.

The mean value of R.M.I. of vitamin B_1 was 0.96 mg. But in this calculation,

Table 4. Nutrient Intakes

Village No.			Cal	Protein g		Fat g		Carb. g	Ca mg	Fe mg		V. A I.U.			V. B_1 mg		V. B_2 mg	Niacin mg	V. C mg		Folate μg	
				total	animal	total	animal			total	animal	(1) activity	animal	carotene	(2)	(3)			(4)	(5)	FrFA	TFA
1	Intake	$\bar{x}$	1,600	41.9	12.3	12.6	6.3	318.9	402	10.8	3.5	904	370	1,588	0.64	0.29	0.38	12.5	22	20	114.4	180.7
		S.D.	317	9.3	6.6	8.5	7.3	53.5	219	3.4	2.2	452	424	1,035	0.14	0.07	0.10	3.6	4	4		
2	Intake	$\bar{x}$	1,584	39.9	10.7	12.3	7.8	319.5	289	9.6	2.2	1,302	633	2,002	0.68	0.34	0.47	12.0	43	39	134.3	207.6
		S.D.	223	5.5	1.8	2.8	2.9	43.4	129	1.1	0.3	606	509	726	0.11	0.04	0.09	1.8	15	13		
3	Intake	$\bar{x}$	1,709	43.4	11.0	12.8	4.4	347.2	388	11.5	2.9	1,054	246	2,487	0.69	0.34	0.50	13.7	69	60	154.9	263.0
		S.D.	302	9.5	5.7	8.8	2.6	54.8	217	5.1	3.5	553	156	1,267	0.11	0.05	0.14	2.1	22	4		
4	Intake	$\bar{x}$	2,153	56.1	15.5	13.3	6.9	440.9	296	15.5	3.2	1,567	351	3,649	1.00	0.57	0.67	20.0	67	58	183.6	317.3
		S.D.	275	9.7	7.6	4.4	4.1	46.3	118	4.6	3.0	431	231	1,313	0.16	0.12	0.30	3.3	19	15		
5	Intake	$\bar{x}$	1,954	50.1	12.0	8.3	2.2	411.9	358	11.7	1.4	1,506	100	4,218	0.91	0.51	0.59	16.1	98	83	173.4	282.4
		S.D.	177	6.8	5.0	1.0	0.7	37.4	72	1.5	0.3	689	83	1,881	0.05	0.13	0.15	2.2	41	31		
7	Intake	$\bar{x}$	1,975	53.2	14.3	12.0	6.1	402.9	403	16.9	5.2	1,480	114	4,099	0.86	0.41	0.98	16.6	75	69	181.2	284.9
		S.D.	266	12.0	10.2	4.3	4.1	49.8	202	7.1	6.2	778	110	2,291	0.16	0.10	0.99	2.6	23	20		
10	Intake	$\bar{x}$	1,852	46.0	12.5	9.2	3.9	385.3	322	9.8	1.5	1,270	243	3,020	0.74	0.38	0.45	14.8	85	77	152.5	228.8
		S.D.	294	8.7	3.7	4.1	4.6	66.7	58	2.2	0.2	680	278	1,292	0.16	0.12	0.13	2.6	31	30		
Mean	Intake	$\bar{x}$	1,832	47.2	12.6	11.5	5.4	375.2	351	12.3	2.8	1,298	294	3,009	0.79	0.41	0.58	15.1	63	58	156.3	252.1
		S.D.	332	10.7	6.6	5.8	4.5	67.6	165	4.7	3.3	651	340	1,763	0.18	0.12	0.44	3.7	28	9		

$\bar{x}$: Mean value

S.D. : Standard deviation

(1) Vitamin A Activity = Retinol (I.U.) + Carotene (I.U.) × 1/3
(2) These values were calculated from raw materials.
(3) These values were corrected by estimation that cooking losses of V. B_1 content in rice were 70%.
(4) These values were calculated from raw materials.
(5) These values were corrected by estimation that cooking losses of V. C were 30 %.

Table 5. Reference Man Ratio based on Thailand Recommended Daily Dietary Allowance

Individual	Age (years)	Calories	Protein	Calcium	Iron	Vitamin				
						A	B_1	B_2	Niacin	C
Men	* 20—29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	30—39	0.96	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00
	40—49	0.92	1.00	1.00	1.00	1.00	0.90	0.93	0.94	1.00
	50—59	0.86	1.00	1.00	1.00	1.00	0.90	0.86	0.82	1.00
	60—69	0.78	1.00	1.00	1.00	1.00	0.80	0.79	0.76	1.00
	70+	0.69	1.00	1.00	1.00	1.00	0.70	0.71	0.71	1.00
Women	20—29	0.71	0.87	0.80	2.67	1.00	0.70	0.71	0.71	1.00
	30—39	0.67	0.87	0.80	2.67	1.00	0.70	0.64	0.65	1.00
	40—49	0.65	0.87	0.80	2.67	1.00	0.70	0.64	0.65	1.00
	50—59	0.61	0.87	0.80	1.00	1.00	0.60	0.57	0.59	1.00
	60—69	0.57	0.87	0.80	1.00	1.00	0.60	0.57	0.59	1.00
	70+	0.49	0.87	0.80	1.00	1.00	0.50	0.50	0.47	1.00
Pregnant		+0.08	+0.37	2.00	4.33	1.00	0.80	0.79	0.79	1.67
Lactating		+0.39	+0.74	2.40	4.33	1.60	1.10	1.07	1.07	1.67
Children	1—3	0.47	0.31	0.80	0.67	0.34	0.50	0.50	0.47	0.67
	4—6	0.61	0.39	0.80	0.67	0.40	0.60	0.57	0.59	0.67
	7—9	0.75	0.44	1.00	0.67	0.54	0.80	0.71	0.71	0.67
	10—12	0.90	0.59	1.20	1.33	0.76	0.90	0.93	0.88	1.00
Boys	13—15	1.10	0.74	1.40	1.83	0.96	1.10	1.07	1.06	1.00
	16—19	1.29	0.83	1.20	1.83	1.00	1.30	1.29	1.29	1.00
Girls	13—15	0.92	0.70	1.20	2.67	0.96	0.90	0.93	0.94	1.00
	16—19	0.86	0.69	1.00	2.67	1.00	0.90	0.86	0.82	1.00

* The "Reference Man" means this age group.

Table 6. Reference Man Ratio (In term of village)

Village No.	Calories	Protein	Calcium	Iron	Vitamin				
					A	B_1	B_2	Niacin	C
1	0.80	0.73	1.03	1.68	0.86	0.83	0.81	0.79	0.96
2	0.81	0.79	1.12	1.62	0.86	0.83	0.81	0.80	0.98
3	0.80	0.79	1.06	1.43	0.87	0.82	0.78	0.79	0.96
4	0.81	0.78	1.01	1.63	0.87	0.82	0.80	0.79	0.95
5	0.77	0.72	1.05	1.44	0.76	0.80	0.77	0.76	0.91
7	0.81	0.78	1.05	1.54	0.85	0.82	0.66	0.77	0.95
10	0.81	0.77	1.12	1.49	0.83	0.84	0.80	0.75	0.95
Mean	0.80	0.77	1.06	1.55	0.84	0.82	0.78	0.78	0.95

Table 7. Reference Man Intake of Nutrient

Village No.			Cal	Protein g		Ca mg	Fe mg	V. A I. U.	V. B_1 mg		V. B_2 mg	Niacin mg	V. C mg	
				total	animal		total	(1) activity	(2)	(3)			(4)	(5)
1	Reference Man Intake	$\bar{x}$	2,001	58.6	17.0	384	6.5	1,059	0.77	0.34	0.46	15.9	23	21
		S. D.	419	14.6		202	2.2	559	0.15	0.09	0.08	4.6	6	6
2	Reference Man Intake	$\bar{x}$	1,948	50.8	13.5	265	6.1	1,524	0.82	0.40	0.58	15.1	45	40
		S. D.	203	4.7		125	0.3	646	0.12	0.09	0.11	1.5	17	17
3	Reference Man Intake	$\bar{x}$	2,162	55.5	13.9	361	7.9	1,234	0.86	0.42	0.64	17.6	73	63
		S. D.	405	13.4		178	2.7	681	0.07	0.07	0.19	2.9	25	23
4	Reference Man Intake	$\bar{x}$	2,671	72.4	20.5	302	9.4	1,779	1.21	0.70	0.84	25.4	71	61
		S. D.	231	14.2		156	2.7	390	0.20	0.12	0.27	3.4	22	18
5	Reference Man Intake	$\bar{x}$	2,481	69.8	16.7	354	8.2	2,016	1.15	0.65	0.77	21.3	106	90
		S. D.	249	10.5		105	1.4	934	0.13	0.18	0.21	2.2	45	35
7	Reference Man Intake	$\bar{x}$	2,510	68.0	17.2	384	10.7	1,773	1.05	0.50	1.20	21.6	80	74
		S. D.	332	9.4		232	3.3	980	0.12	0.12	1.08	2.1	29	27
10	Reference Man Intake	$\bar{x}$	2,292	60.6	16.7	293	6.6	1,555	0.89	0.46	0.56	19.9	89	72
		S. D.	278	10.6		69	1.3	861	0.13	0.11	0.12	3.2	35	50
Mean	Reference Man Intake	$\bar{x}$	2,295	62.2	16.5	335	7.9	1,563	0.96	0.50	0.70	19.5	70	60
		S. D.	404	13.9		144	2.8	809	0.23	0.16	0.53	4.7	37	36

$\bar{x}$: Mean value

S. D. : Standard deviation

(1) Vitamin A Activity = Retinol (I. U.) + Carotene (I. U.) × 1/3
(2) These values were calculated from raw materials.
(3) These values were corrected by estimation that cooking losses of V. B_1 content in rice were 70%.
(4) These values were calculated from raw materials.
(5) These values were corrected by estimation that cooking losses of V. C were 30%.

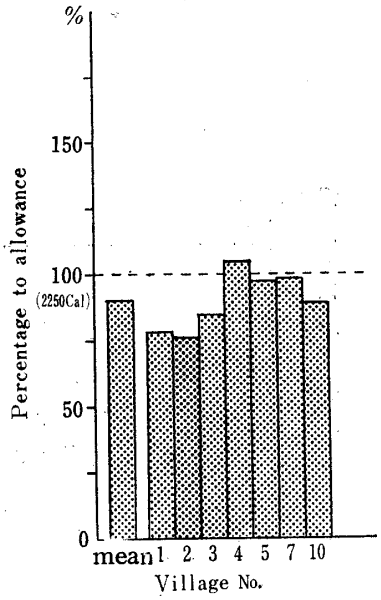

Fig. 1-1
Calorie Ref. Man Intake

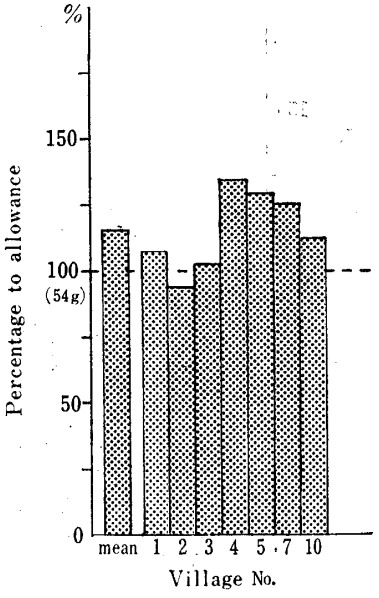

Fig. 1-2
Protein Ref. Man Intake

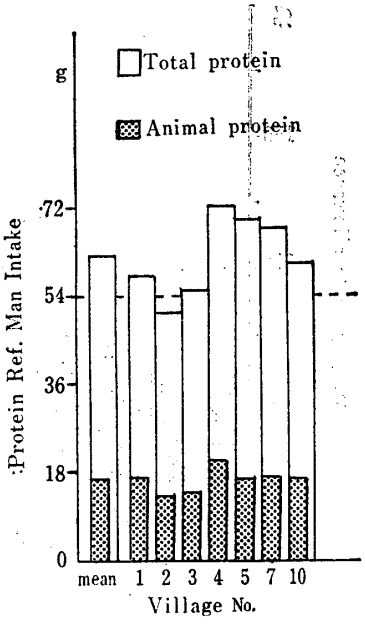

Fig. 1-3
Animal Protein Ref. Man Intake

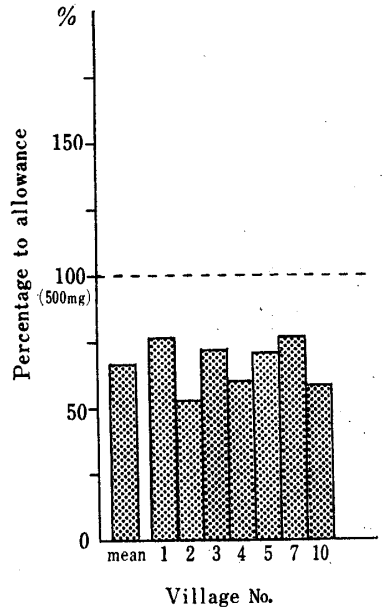

Fig. 1-4
Calcium Ref. Man Intake

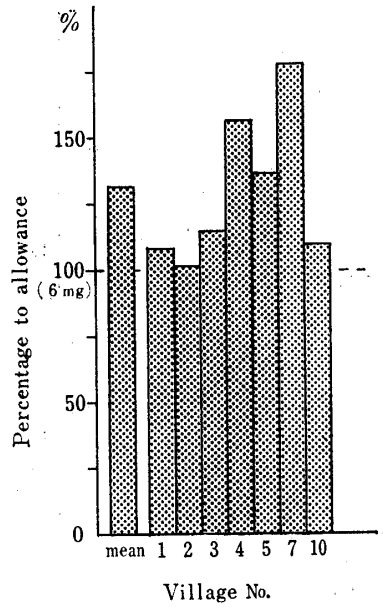

Fig. 1-5
Iron Ref. Man Intake

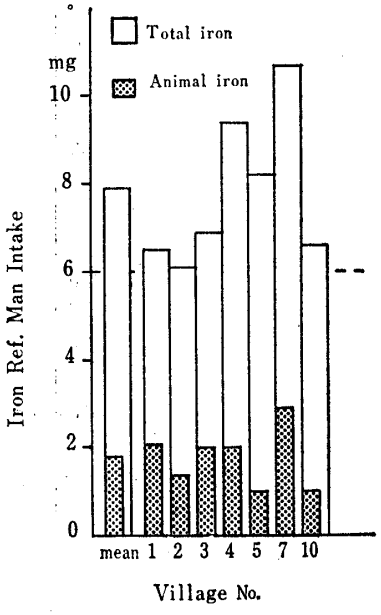

Fig. 1-6
Animal Iron Ref. Man Intake

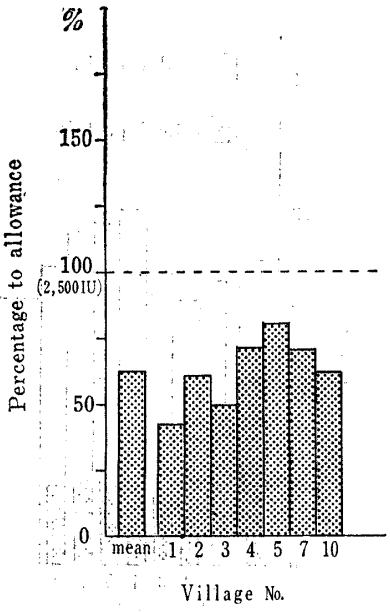

Fig. 1-7
Vitamin A Ref. Man Intake

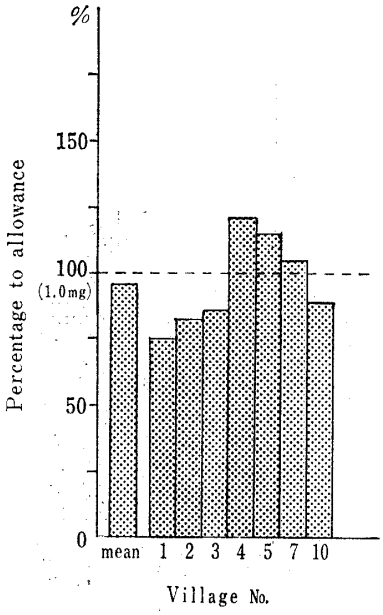

Fig. 1-8
Vitamin B_1 Ref. Man Intake

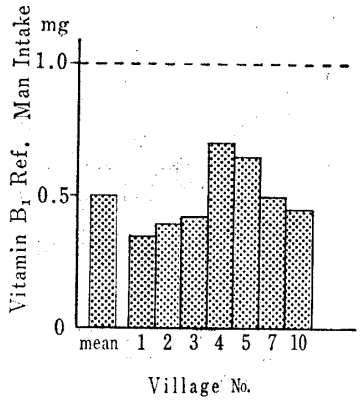

Fig. 1-9
Vitamin B_1 Ref. Man Intake Calculated by Estimation of Cooking Loss in Rice

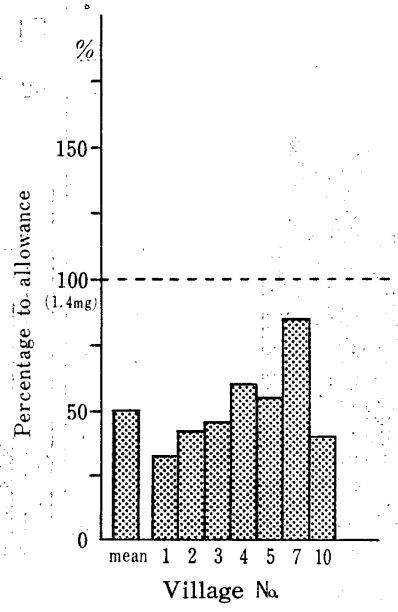

Fig. 1-10
Vitamin B_2 Ref. Man Intake

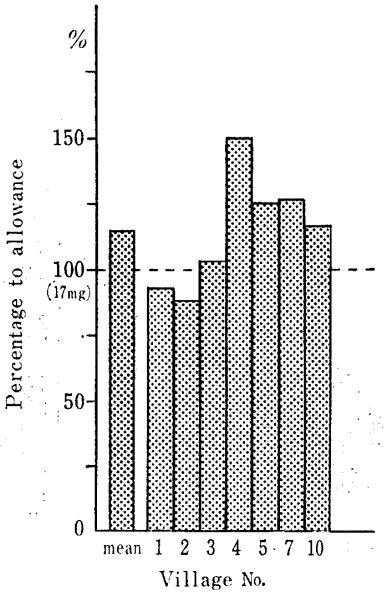

Fig. 1-11
Niacin Ref. Man Intake

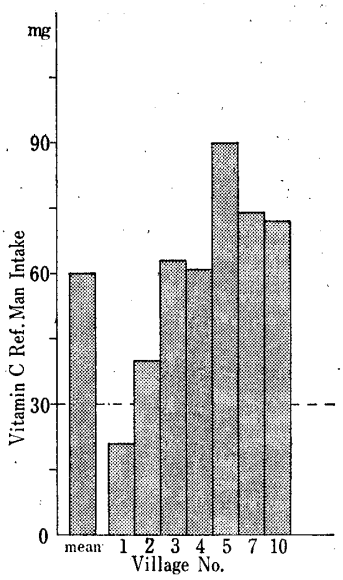

Fig. 1-12
Vitamin C Ref. Man Intake Calculated by Estimation of Cooking Loss in Vegetables

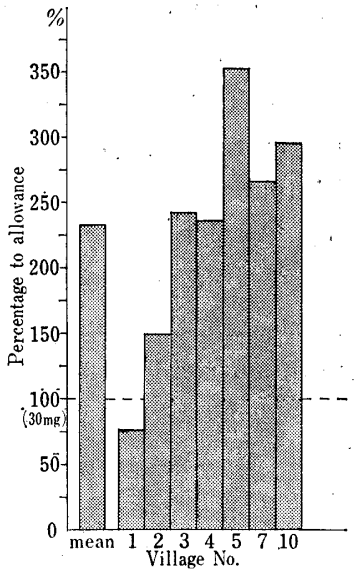

Fig. 1-13
Vitamin C Ref. Man Intake

each value was determined directly from the raw materials of foodstuffs. Regarding vitamin B_1 intake, it was confirmed that the measured values on R.M.I. were larger than the Thailand recommended allowance in two cases of villages No. 4 and No. 5. However, when the cooking losses of vitamin B_1 in rice were taken into consideration, the real intake became presumably set below 70 % to Thailand allowance in each case of all villages.

The mean value of R.M.I. of vitamin B_2 was 0.70 mg. And the standard deviation was ± 0.53 mg in this case. It was observed that the intake of vitamin B_2 had not been enough in each case of all villages. Particularly, it was conspicuous that the calculated value of standard deviation was so-widely kept in this case of vitamin B_2. For example, in the case of village No. 7, the intake was kept in the level of 85.7 %, but in other cases of all, the level of intake was ranged from 30 to 60 % to the allowance.

The mean value of R.M.I. of niacin was 19.5 mg. This intake of niacin was almost enough in each case of all villages.

The mean value of R.M.I. of vitamin C was 70 mg. And those measured and calculated values of vitamin C intake were kept to be above the level of recommended allowance in Thailand, except for the case of the village No. 1. Even when the cooking losses were considered, the intakes of vitamin C had been kept to be above the level of recommended allowance in Thailand, except for the case of the village No. 1.

As recommended folic acid allowance had not been determined, Reference

Man Intake of folic acid could not be calculated. And concerning to the intake of free folic acid per day per man, it was observed that the average value of those intake with each village-distinction had been ranged from 114.4 μg to 183.6 μg. At the same way, the measured and calculated values of intake in the case of total folic acid had been ranged from 180.7 μg to 317.3 μg. Total mean value of free folic acid intake was 156.3 μg and also in the case of total folic acid, it was 252.1 μg.

On the base of these examinations of all like the above mentioned, when the values of nutrient intake were compared among each case of all villages, it was concluded that the lower level of nutrient intake could be seen in the cases of the villages No. 1 and No. 2. On the contrary, the higher value of nutrient intake could be seen in the cases of the villages No. 4 and No. 7.

Having compared with the case of recommended dietary allowance in Thailand, it could be confirmed that the intakes of the following nutrients— i.e. protein, iron, niacin and vitamin C — were somehow or other kept above the level of the recommended dietary allowance in Thailand. The intake which were clearly kept below the level of recommended allowance could be recognized in each of the following nutrients — i.e. calcium, vitamin A, vitamin B_1 (after cooking) and vitamin B_2.

b) Mean Daily Consumption of Foods per Person

With regard to the values of mean daily consumption of foods per person, the mean values of this results are shown with each village-distinction in Table 8. Namely, the largest one among the values of the intakes of animal foods was 91.2 g (in the case of village No. 4) and the smallest one among them was 55.3 g (in the case of village No. 3). And also the mean value of them in all cases was 65.9 g. Concerning the case of vegetable food, the largest value of intake of vegetable food was 928.3 g (in the case of village No. 5). And the smallest one among the values of the intakes of this food was 481.7 g (in the case of village No. 1). The mean value of them in all cases was 697.2 g. Furthermore, the ratios of the two mean values to the total consumption were respectively 8.6 % and 91.4 %. In comparison the Thailand data of mean daily consumption of foods per person with the Japanese data of mean daily consumption of foods per person (inquired in 1971 in the term of nation-wide, means of farming family)[5], it could be observed that the intake of animal food was kept at the rate of 30.4 % of Japanese intake of animal food and the intake of vegetable food was kept at the rate of 66.5 % of the value of Japanese.

With regard to the items of animal food consumption, the consumed quantity of fishes and shellfishes (in which fermented fishes and fish sauces are included) was kept at the highest level, and small fishes, crabs, shrimps

Table 8. Mean Daily Consumption of Foods per Person

Food Items \ Village No.	1	2	3	4	5	7	10	Mean
Total Food Consumption	544.2	618.2	706.8	965.3	995.1	808.8	710.5	764.0
Animal Food	62.0	64.0	55.3	91.2	65.6	62.0	61.4	65.9
Vegetable Food	481.7	553.6	650.3	873.5	928.3	744.1	647.7	697.2
Cereals	389.5	393.3	409.8	520.2	480.5	482.4	455.8	447.3
Rice	389.5	392.9	409.8	517.7	468.2	482.0	453.8	444.8
Others	0	0.4	0	2.5	12.3	0.4	2.0	2.5
Seeds and Nuts	0	0.8	8.2	0	2.8	7.1	1.1	2.9
Potatoes	3.2	0	6.2	8.2	23.1	2.0	1.6	6.3
Sugars	0	0	3.1	0.1	1.0	1.4	0.3	0.8
Confectioneries	0	0.3	1.0	3.0	0.1	0.1	0.1	0.7
Fats and Oils	2.1	2.2	1.0	1.9	0	0.1	0.3	1.1
Pulses	1.4	0	0.5	0	0	2.7	0.3	0.7
Fruits	4.8	12.0	42.6	111.7	203.7	31.0	73.9	68.5
Vegetables (carotene $\geqq$ 1,000 I.U.)	16.6	37.4	43.7	35.3	45.3	39.8	45.5	37.7
Other Vegetables	61.3	104.7	100.5	184.9	162.0	175.4	61.6	121.5
Fungi	0	0	4.8	0	0.3	0	0	0.7
Seaweeds	0	0	0	0	0	0	0	0
Condiments	16.1	19.3	25.2	28.4	30.5	16.9	21.3	22.7
Fish sauce (nampla)	5.2	6.2	4.5	10.1	5.5	3.0	5.8	5.8
Fermented fish (plara)	6.4	8.0	12.6	7.7	14.3	9.1	9.7	9.7
Salt	0.5	0.6	1.2	0.6	1.2	0.9	1.4	0.9
Monosodium glutamate	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.3
Garlic	1.3	1.0	0.6	1.0	0.3	0	0.4	0.7
Chilli pepper	2.6	3.8	6.0	8.6	8.0	3.4	3.6	5.1
Others	0	0	0.1	0.1	0.9	0.2	0	0.2
Beverages (coconut water)	0	0	23.0	0	0	0	3.1	3.7
Fish and Shellfish	35.5	20.0	27.3	22.2	21.8	25.6	33.1	26.5
Fresh	20.9	13.0	15.9	21.2	10.2	18.0	26.7	18.0
Dried	8.3	5.9	6.1	0.2	2.5	5.8	2.3	4.4
Others	1.9	1.1	0.2	0.8	9.1	1.8	4.1	2.7
Shell	4.4	0	5.1	0	0	0	0	1.4
Meats	8.0	4.7	8.7	39.2	20.6	17.7	10.0	15.5
Beef, Pork	1.6	4.0	2.9	17.3	0.2	12.6	0.1	5.5
Poultry	6.4	0.7	2.9	0	3.3	0	6.3	2.8
Frog	0	0	2.9	21.9	17.1	5.1	3.6	7.2
Other Animals	0	1.2	1.2	3.1	2.5	4.9	0	1.8
Eggs	5.7	21.7	0	7.1	0.9	1.6	2.5	5.6
Milk	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0
NaCl Intake	2.8	3.3	4.1	3.2	3.1	4.5	4.4	3.6

and mud snails — all of them that inhabited in the river and lake —, all of these kinds were representative ones among the fishes and the shellfishes of all. And then, farmers in north-eastern part of Thailand took almost them fresh (not processed). Also some of those foods like the above-mentioned were to be cured and were to be fermented fishes or salted fishes. Then, among the animal food consumptions of all, the most important animal proteinic foodstuffs were fishes and shellfishes. As for the intakes of these fishes and shellfishes, the differences of those quantities with each village-distinction were observed somehow. However, in each case of all villages, the intake of fishes and shellfishes was above 20 g.

As for the case of mean consumption of meat, it was observed that the value of its quantity was 15.5 g. The ratio of this value to total consumption of animal food was 23 %. Frog was ingested at the most large quantity among other intakes of all meat. Next, buffalo meat and pork were ingested at the secondarily-largest quantity among them. Poultry was intaked at the thirdly-largest quantity among them. Other animal foods except for the animals like the above-mentioned, were pupae of silkworms, mice and aquatic insects. But the intakes of these animals were very small.

The kind of eggs was mainly duck egg. And the intake of duck egg was 5.6 g. And also, its ratio of intake to total amount of animal food was 8.5 %.

As for the intake of vegetable food, it was recognized that the intake of cereals was set in a higher level. Among the cereals of all, the ratio of rice intake to the total intake of cereals was 99.4 %. In the case of other cereals than rice (i.e. — corn), the ratio of them to the total intake of cereals was 0.6 %. Maximum intake of cereals was 520.2 g (in the case of village No. 4) and its minimum value was 389.5 g (in the case of village No. 1), and then its mean value was 447.3 g. And also the intake of all cereals was in the ratio of 112.4 % to the Japanese total intake of cereals which had already been quoted above.

Concerning vegetable, the mean intake of high carotene vegetable (carotene $\geqq$ 1,000 I.U.) was 37.7 g. And this intake was in the ratio of 23.7 % to the total amount of vegetables. On the other hand, the intake of low carotene vegetable (carotene $<$ 1,000 I.U.) was 121.5 g. This intake was in the ratio of 76.3 % to the total amount of vegetables. And then, it was recognized that the intake of high carotene vegetables was in the lowest level in the case of village No. 1.

Next, with regard to various fruits, the mean value of intake of them was 68.5 g. Its maximum value of intake was 203.7 g (in the case of village No. 5). Its minimum value of intake was 4.8 g (in the case of village No. 1). So, there are great-wide differences between those values of intakes of all

villages. Particularly in the case of village No. 5, intake of fruits was in higher level. This reason was that the intake of water melon was in higher level than in other cases of all villages. Consumption of various kinds of seeds, potatoes, sugars, oils and fats, pulse and mushrooms were almost in lower level.

Seaweeds barely had been happened to see in market place of town. But the farmers who had been the subjects for the survey had never eaten all of these seaweeds.

As for the conditions for intaking various seasonings and condiments, there were no great difference in each sort of quality and in quantity with each one of these seven villages. And then, fermented fish (in which presumably NaCl of 13 % was contained) and fish sauce (in which NaCl of about 27 % was contained) could be regarded as the main items of all condiments and seasonings. The mean value of intakes of salt was 0.9 g. However, when the salt content of the above-mentioned items (i. e. —condiments, seasonings and salted fishes) and stock vegetables was added to the intake of salt, mean value of total salt intake was 3.6 g.

Regarding the case of intake of drinks, coconut water could just only been observed.

DISCUSSIONS

a) Constituent Ratio of Nutrients

What items of nutrients composed the calorie intake are shown in Table 9. The values in Table 9 were examined and discussed by showing the Japanese

Table 9. Contribution of Each Nutrient to Calorie Intake and Animal Protein Ratio

	Thailand (a)	Japan (b)
$\frac{\text{Cal from protein}}{\text{Total Cal}} \times 100$	10.3 %	13.2 %
$\frac{\text{Cal from fat}}{\text{Total Cal}} \times 100$	5.7 %	16.3 %
$\frac{\text{Cal from carbohydrate}}{\text{Total Cal}} \times 100$	81.9 %	69.3 %
Vitamin B_1 intake per 1,000 Cal	0.43 mg	0.38 mg
V. B_1 intake per 1 Cal except for fat	0.46 γ	0.45 γ
$\frac{\text{Animal protein}}{\text{Total protein}} \times 100$	26.7 %	40.3 %

(a) Khon Kaen

(b) Nutrition Survey of Japanese (farmer's family) (1971)

constituent ratio of nutrients at the same time.

Generally speaking, in the case of Thailand, it was observed that the calorie intake from carbohydrate was held to a high extent and, on the other hand, that the calorie intake from protein and fat was held to a low extent. In terms of comparative considerations the Thailand's case with the Japanese case, the calorie intake from protein and fat in the case of Japanese was more plentiful than in the Thailand's case.

Concerned with the vitamin B_1 intake per 1,000 Cal, its measurement value was 0.43 mg in this survey. However, when the cooking losses and low fat meal are considered, this value is not so high level.

As for the case of animal protein, its ratio of intake to total protein intake was 26.7 %. Incidentally, this animal protein ratio in Japan is 40.3 %.[5] So, with regard to this case of animal protein, its intaked ratio in the Thailand's case is two-third of the intaked ratio in the Japanese case (namely, 26.7 % in Thailand's case versus 40.3 % in Japanese case).

In the case of total protein Reference Man Intake, its recommended dietary allowance had been obtained once. But, the pattern of essential amino acid is probably poor.

b) Contribution of Rice to individual Nutrient Intake

On the base of the data of survey on mean daily consumption of foods per person, it was observed that the constituent ratio of rice intake to total intake of all foodstuffs was 58.2 %. Specifically, this ratio of rice is remarkably taken at a higher level. The results and data of calculation of the contribution ratios of rice to the intake of each nutrient are shown in Table 10. Namely, the contribution of calorie from rice to the intake of total calorie was 89 %. And in the case of the protein, its ratio was 65% . And next, in the case of calcium, its ratio was 20 %. Its ratio about iron was 40 %. In the case of vitamin B_1, its ratio was 73 %. And then concerning vitamin B_2, its ratio was 31 %. Therefore, concerning these values of each contribution ratios of nutrients from rice to each total intake of nutrients, it is concluded that each one of these nutrients of rice takes the most

Table 10. Contribution of Rice to Individual Nutrient Intake

Items	Intake from rice	S. D.		Percent contribution to total diet
Calorie	1,628	± 303	Cal	89 %
Protein	30.7	± 5.5	g	65 %
Ca	71.2	± 12.3	mg	20 %
Fe	4.9	± 0.9	mg	40 %
V. B_1	0.58	± 0.10	mg	73 %
V. B_2	0.18	± 0.06	mg	31 %

definitive significances in the balance of intaking each nutrient in general.

c) Intake of Folic Acid

Concerning the main foodstuff, that is namely, rice, intake of folic acid was calculated by referring analytic values on cooked materials. As for other folic acid-sourced foodstuffs than rice, which were namely vegetables and fruits, it was observed that those were generally not ingested scantily and were eaten raw. So, the cooking losses of folic acid were not calculated.

The folic acid intake per caput per day (not converted into Reference Man Intake) was 156 μg as free folic acid in the case of this survey. In this connection, FAO/WHO recommended intake for adult man was defined as 200 μg as free folic acid.[6] This value of intake was probably deemed to be kept in normal and preferable level.

d) Intake of Iron

On the base of dietary survey data concerned with each family, the numerical values of dietary intake per day per person was calculated. The results of these calculations had been already shown in Table 4. As for the values of iron intake among those data of calculations, the mean value of the iron intakes was 12.3 mg. When this mean value was compared with the numerical results on survey which had been carried out in 1960 by I.C.N.N.D.[7], this mean value of 12.3 mg was smaller than the mean value (17 mg) of iron intake (calculated on the base of Standard Food Table) observed in the case of surveying in Udorn province. Udorn province is geographically located in north-eastern part of Thailand, and in the same part as the Khon Kaen province investigated at this time. And then, it was confirmed that this mean value of iron intake in this time (12.3 mg) was larger in some degree than the mean value (10 mg) that had been computed concerning to all cases of the five areas (i.e.—Udorn plus other four areas) appointed in the survey of 1960. Furthermore, the value of Reference Man Intake was calculated based on daily dietary intake per person per day and Reference Man Ratio, because there were various differences in recommended allowances with each age-distinction and with each sex-distinction (Table 7). The mean value of Reference Man Intake of iron was 7.9 mg as the result of this survey. This level of iron intake was higher than the level of Thailand recommended iron allowance for Reference Man (6 mg). However, when the values of iron Reference Man Intake are observed with each family-distinction, the values of eight families are recognized to be lower level than 6 mg among forty-two families of all. The difference of iron intake was observed with each family-distinction among those forty-two families. Furthermore, it was presumed that there was necessarily a difference of iron intake with each person-distinction among these subjects. Therefore, the iron intake for each person

was calculated from the Standard Man Ratio (S. M. R.) about total diet amount based on Table 11.

Table 11. Standard Man Ratio [8]

Age (years)	Standard Man Ratio	
	(Male & Female)	
< 1	0.25	
1 — 3	0.35	
4 — 6	0.50	
7 — 9	0.65	
10 —1 2	0.75	
	(Male)	(Female)
13 — 15	1.00	0.75
16 — 19	1.20	0.70
20 — 59	1.00	0.80
≧ 60	0.75	0.55
Pregnant women	—	1.00

That is ....

Intake= (Iron intake per caput) ÷ (S. M. R. of a family based on Table 5)
× (S. M. R. for individual based on Table 11)

Table 12. Iron Intake Calculated from Standard Man Ratio

Age (years)	Sex	n	Iron Intake (mg)	
			Mean	S. D.
1 ~ 3	Male Female	20	5.6	± 1.6
4 ~ 5	Male Female	17	8.6	± 3.2
6 ~ 9	Male Female	30	10.3	± 3.4
10 ~ 12	Male Female	14	11.2	± 3.6
13 ~	Male	46	16.1	± 6.3
13 ~ 49	Female	35	12.5	± 4.7
50 ~	Female	11	11.2	± 4.6
Pregnant and Lactating Women		17	17.0	± 6.9

The results of the calculations are shown in Table 12. Each datum of these results had been arranged at distinction of every sex and age group. On the base of this datum in Table 12, the numerical value of iron intake for adult man was 16.1 mg. This numerical value of 16.1 mg is set above the Thailand

recommended iron allowance for adult man (6 mg) by far. On the contrary, the value of iron intake of adult women who were in menstruation age was 12.5 mg. This value of 12.5 mg is set below the Thailand recommended iron allowance for adult woman (16 mg). And also, concerned with pregnant women and lactating mother, the value of iron intake of them is 17 mg. This numerical value is set below the recommended allowance of iron (26 mg) by far. On the base of these examinations like the above mentioned, it was presumed that the iron intake of adult woman, generally speaking, had been kept in the insufficient level, in comparison with the recommended iron allowance.

It is generally known that the rate of intestinal absorption of vegetable iron is held in a lower level than that of animal iron.[9] The rate of intake of animal foodstuffs, calculated from these data of this survey, was small. And this rate of intake was below 10 % of total amount concerning to calorie intake. In the cases of this pattern of food intake, values of recommended iron intake by Joint FAO/WHO Expert Group are shown in Table 13. When each one of the various values shown in Table 13 was compared with the estimated values of iron intake at every group-distinction regarding the group of children under five years of age as well as pregnant women, lactating mother and other women who had been menstruation age, each iron intake was lower level than the recommended intake of iron by FAO/WHO. Furthermore, when their higher infestation rate of hookworm was considered at the same time, all of these three groups can certainly be regarded to be iron deficiency.

Table 13. Recommended Daily Iron Allowance and Iron Intake

	THAILAND Recommended Allowance		WHO Recommended Intake[6] (Animal Foods/Total Cal <0.1)
	Age (Years)	Iron (mg)	Iron (mg)
Children	1—9	4/kg body weight	10
	10—12	8	10
Boys	13—16	11	18
	17—19	11	9
Girls	13—16	16	18
	17—19	16	24
Men	20≦	6	9
Women	20—49	16	28
	50≦	6	9
Pregnant & Lactating Women		26	28

e) Economic Status and Nutritional Status

Survey-data of each intake of nutrients and the economic status of farmers

Table 14. Economic Status and Nutritional Status

Village No.	Income baht/family	Land rai/family	Domestic animal per family	Nutrition: Protein Animal	Nutrition: Protein Total	Nutrition: Calorie	Nos. of food items
	baht	rai	a 2.3 b 0 c 0 d 11.2 e 2.7	g	g	Cal	
1	5,238 (per man 551)	12.8		17.0	58.6	2,001	20.3
2	8,725 (1,163)	29.2	a 0.3 b 3.3 c 0.3 d 10.0 e 3.2	13.5	50.8	1,948	24.7
3	5,938 (1,188)	13.7	a 0.2 b 0.8 c 0 d 10.2 e 0	13.9	55.5	2,162	25.3
4	11,566 (1,509)	41.2	a 1.5 b 4.0 c 1.0 d 8.7 e 7.0	20.5	72.4	2,671	30.3
5	3,688 (515)	11.0	a 0 b 1.0 c 0.2 d 2.5 e 0	16.7	69.8	2,481	23.8
7	3,408 (620)	12.5	a 0.7 b 1.7 c 0.3 d 10.0 e 2.0	17.2	68.0	2,510	23.0
10	4,202 (720)	17.2	a 0 b 0.2 c 0.5 d 8.5 e 0	16.7	60.6	2,292	22.8
Mean	6,109 (888)	19.7	a 0.7 b 1.6 c 0.3 d 8.7 e 2.1	16.5	62.2	2,295	24.3

Note : a···Buffalo, b···Cattle, c···Pig, d···Chicken, e···duck

in north-eastern Thailand were arranged with each family-distinction. These subjects were the same as the ones for dietary survey. And also, each mean value of them are shown with every village-distinction in Table 14. According to these data and results, people in the village of No. 4 had the highest standard of economic status and of nutritive conditions among other villages of all. However, for instance, although the people in the village of No. 5 had the lowest standard of economic status, their intake of nutrients was relatively high level. The people in the village of No. 2 had the second-best standard of economic status, but their intake of nutrients was held in a lower level. As this instance, nutritional conditions could not be determined alone on the base of economic conditions. Every one of the surveyed families kept poultry, but according to the results and data on the intake of foodstuffs, egg was not ingested in most of those families. As this example, the frequency of intake of the foodstuffs that people could buy for cash was extremely low level.

II. SURVEY OF FREQUENCY OF FOOD INTAKE

Each family that was picked up as a subject for this frequency survey was the same one as the subject for dietary survey. The data of frequency of food intake by interview had been summed up and recorded. These results and data of this survey are shown in Table 15-1 and 15-2. According to these two tables, the patterns of ingested groups of foodstuffs were confirmed. Namely, glutinous rice and vegetable were daily and available food materials. Fishes were intaked almost every day in many families. As cleary shown in Table 8, fishes were intaked in a extremely small quantity at a time, but the frequency of fish intake was in a very high level. "Potatoes" includes sweet potato, cassava root, taro and yam in this Table. But these potatoes were not intaked so much. Frog, chicken, buffalo, duck, pork and beef are indicated as "meat". The frequency of intake of these meats was low level. As for the case of eggs, the egg of duck was available one. However, only a few families took these eggs frequently. Besides, some families had never taken these eggs of duck. Oil and fat were the available ones for just only frying the various foodstuffs at home. But the quantity of using oil and fat was small in every case. The frequency of using them was extremely low level. Lard was generally used as the food materials for cooking. Coconut oil could not found as the available one for cooking in this term. As for the case of sugar, it was recognized that cane sugar was very precious foodstuff and also that most of all families seldom used this. As for the case of tea, every family in this province had never taken tea. However, when people went to market place, they rarely took tea. This means that farmers took tea once

Table 15—1. Frequency of Food Intake

Name of Foods \ Frequency	Every day	Very often (twice a week)	Sometimes (once a week)	Rare (once a month)	None
Glutinous rice	※※※				
Potato				※※	※
Fish	※※	※			
Meat			※	※※	
Egg			※	※	
Milk and Milk products				※	※※
Vegetable	※※※				
Fruits		※	※		
Oil and Fat			※	※	
Sugar				※※	※
Alcoholic beverage				※	※※
Tea				※	※※

※※※ 90 % ～
※※ 50 % ～
※ 20 % ～

Table 15—2. Frequency of Food Intake

Name of Foods \ Frequency	Every day	Very often (twice a week)	Sometimes (once a week)	Rare (once a month)	None
Glutinous rice	42	0	0	0	0
Potato	0	2	4	22	14
Fish	21	16	3	2	0
Meat	1	2	12	24	3
Egg	4	8	12	13	5
Milk and Milk products	0	2	3	10	27
Vegetable	40	2	0	0	0
Fruits	3	12	15	11	1
Oil and Fat	0	11	8	14	9
Sugar	0	5	6	21	10
Alcoholic beverage	2	2	3	14	21
Tea	0	1	2	5	34

in a great while. Every farmer in this province had never taken milk, too. However, exceptions were a few cases that they drank tea with milk at the market place. Therefore, it seems that to drink milk does not considerably suit their taste. And then, as for the case of alcoholic beverages, the people who can gain income on cash, might intake the alcoholic beverages, but it can be said that people do not generally intake it so much. Papaya, banana and water melon were most available and representative fruits which people of this province could see so frequently. But people in this province did not so often eat them. In addition to these three fruits, there are many and various kinds of fruits in this province—e. g., guava and sugar apple, etc.. The unripe papaya can be so often used as the available vegetable.

According to the above mentioned analysis of all the data of interviewing survey on the frequency of food intake, it was observed that the foodstuffs which farmers in Khon Kaen chiefly and principally intake were rice, vegetable and a small quantity of fishes. Concerning the data of survey carried out during two days for weighing the quantity of food intake, it was recognized that these data were the same as the data of interviewing survey on the frequency of food intake.

III. SURVEY ON GENERAL CONDITIONS OF EATING HABITS

160 Families were inquired about 15 itemized questions that are shown in Table 16. These items of questions in Table 16 were arranged in due order from higher frequency of the answer in each item to the lower one. Each one of these items for interviewing was examine and to verify in due order.

1. As for the case of the various foodstuffs that people buy in the market place and consume, marine fishes and their processed food (e. g. — stock fish and steamed fish), in addition, meats and furthermore condiments were very important and available ones. Concerning the case of homemade products, namely, vegetables, fresh water fishes and shellfishes (in which shrimp, crab and shell were included) could be consumed for family use. The fishes and shellfishes could be generally regarded as the small-sized ones that were worthless dealing in commercial transactions. The small-sized frogs that were worthless dealing in commercial transactions could also be consumed for family use. The foodstuffs in this province mentioned as green leaves are mainly the leaves of trees belonging to the family of *Leguminosae*. "Rice" did not come out in Table 16. This meant distinctly that most of families were self-sufficient for rice. This matter was so common that they did not answer.

Table 16. Eating Habit

1. Food consumption mostly from·····

a) The market i. e.·····

1)	Fresh fish (Sea fish)	68	9)	Chilli pepper	9
2)	Stock fish	46		Salt	9
3)	Meat	38	11)	Fat	5
4)	Pork	19	12)	Egg	4
5)	Fermented fish	16	13)	Monosodium glutamate	2
6)	Beef	15		Chicken	2
	Vegetable	15		Fruits	2
8)	Fish sauce	10	16)	Rice	1

b) Production i. e.·····

1)	Vegetable	109	8)	Chilli pepper	2
2)	Fish (fresh water fish)	79		Fermented fish	2
3)	Frog	48	10)	Buffalo	1
4)	Crab	31		Beef	1
5)	Shell	27		Chicken	1
6)	Shrimp	15		Garlic	1
7)	Green leaves	9			

2. Food management according to·····

a)	Desire	4	b) Food availability 158

3. Rice for eating :

a)	Glutinous rice, milled	146	c) Ordinary rice, milled	2
b)	Glutinous rice, home pound	3		

4. Method of cooking rice :

a)	Steam	160	b) Discard water	1

5. Restriction of food for the family :

a) No. 151

b) Yes. ex.

1)	Buffalo	3	4)	Tortoise	2
2)	Swamp eel	3	5)	Fermented fish	1
3)	Pork	2		Snake	1

6. Generally do you think of restriction of food for the patient?

a) No. 21

b) Yes. i. e.·····

1)	Fruits	47		Papaya	5
2)	Sweet	29		Swamp eel	5
3)	Banana	20	19)	Chicken	4
4)	Somtam	19		Fish	4
5)	Buffalo	18		Ice	4
6)	Vegetable	15		Water melon	4
7)	Yard long bean	13	23)	Chado fish	3
8)	Tamarind	11		Fermented fish	3
9)	Beef	8		Pork	3
	Guava	8		Serpent headed fish	3
	Sour food	8	27)	Shell	2
12)	Coconut	6		Acacia insuavis	2
	Fermented foods	6	29)	Acacia	1
14)	Duck	5		Cap fish	1
	Meat	5		Mango	1
	Orange	5		Noodle	1

Prawn	1	Tortoise	1
Salted fish	1	Peanut	1
Star fruit	1		

7. Milk feeding :

a) Breast milk 142 b) Sweetened condensed milk 2 c) Evaporated milk 1

8. Weaning :

When ?

					Because of ·····	
1)	2—under	3	years	58	1) Pregnant mother	122
2)	3— 〃	4	〃	48	2) Having new baby	9
3)	1— 〃	2	〃	26	3) Grown up	4
4)	4— 〃	5	〃	10	4) Sick mother	2
5)	over	5	years	7	Working mother	2
	(Still continue 1)					

9. Have you ever chewed the food for a child ?

a) No.	12
b) Yes.	147
1) Still continue	72
2) Omit, because·····	
(1) Grown up	68
(2) Having new baby	4
(3) To recline good suggestion	2
(4) Have no baby	1

10. Restricted food for pregnancy :

a) No. 136

b) Restricted for·····

1)	Buffalo	4	8) Fat	1
	Sweet candy	4	Fermented food	1
3)	Potato	3	Linfaw	1
4)	Beef	2	Mushroom	1
	Egg	2	Rabbit	1
	Hot food	2	Raw papaya	1
8)	Somtam	2	Sea fish	1
	Alcohol	1	Taro	1
	Baked rice	1	Water fern	1
	Coconut	1		

11. General food for pregnancy are·····

1)	Fish	56	17) Coriander	4
2)	Everything	50	Fermented fish	4
3)	Vegetable	42	Shell	4
4)	Meat	31	20) Egg	3
5)	Fruits	26	Namprick	3
6)	Beef	25	Sour food	3
7)	Buffalo	15	Swamp cabbage	3
8)	Pork	12	24) Desert	2
9)	Sweet	9	Duck	2
10)	Somtam	8	Noodle	2
11)	Chicken	6	Prawn	2
	Frog	6	28) Fat	1
	Mustard greens	6	Potato	1
	Other vegetables	6	Salt	1
15)	Crab	5		
	Chinese cabbage	5		

12. Restricted food for lactating mother :

a) Nothing 18

b) Restricted for .....

1)	Acacia insuavis	99
2)	Buffalo	72
3)	Chado fish	39
4)	Beef	34
5)	Fish	33
6)	Serpent headed fish	24
7)	Coriander	20
8)	Duck	14
9)	Water fern	11
10)	Onion	8
11)	Horse shoe crab	7
12)	Swamp eel	5
	Coconut	5
	Crab	5
15)	Acacia	3
	Bamboo shoot	3
	Corn	3
	Shell	3
	Sweet	3
	Tortoise	3
	Vegetable	3
	White fish	3
23)	Cat fish	2
	Chicken	2
	Gord gourd	2
	Horse radish	2
	Rabbit	2
	Rat	2
	Salted fish	2
	Squid	2
	Yard long bean	2
32)	Bird	1
	Cabbage	1
	Chinese cabbage	1
	Duck weed	1
	Fermented food	1
	Frog	1
	Gizzard	1
	Guava	1
	Linfaw	1
	Meat	1
	Papaya	1
	Plantain flower	1
	Pork	1
	Prawn	1
	Somtam	1
	Sour food	1
	Scorpion fish	1
	Silk worm (pupae)	1
	Squash flower	1
	Swamp cabbage	1
	Sweet basil	1
	Yarn	1
	Water melon	1

c) Why ? Because of .....

1)	Get sick	53
2)	Dangerous to uterus	23
3)	Dizziness	4
4)	Dangerous to health	2
5)	Headache	2

13. Food for lactating mother :

1)	Everything and not restricted	46
2)	White fish	27
3)	Beef	25
4)	Fish	24
5)	Vegetable	24
6)	Serpent headed fish	21
7)	Chinese cabbage	20
8)	Cap fish	17
9)	Chicken	16
10)	Cat fish	14
	Climbing perch	14
	Pork	14
13)	Laos coriander	9
	Plantain flower	9
15)	Meat	8
	Shell	8
17)	Banana	7
	Fruits	7
19)	Frog	6
20)	Onion	5
	Salt	5
22)	Acacia	4
	Buffalo	4
	Crab	4
	Egg	4
26)	Fermented fish	3
	Swamp cabbage	3
28)	Baked fish	2
	Curry	2
	Dry fish	2
	Mustard greens	2
	Namprick	2
	Sesban cacia flower	2

34)	Boiled fish	1	34)	Gord gourd	1
	Coconut water	1		Mushroom	1
	Cucumber	1		Rice with salt	1
	Duck	1		Shrimp	1
	Galanga	1		Some medicine	1
	Garlic	1		Steamed striped mackerel	1
14.	Food are best taken during menstruation :				
1)	Sour food	43	6)	Fish	1
2)	Everything	19		Orange	1
3)	Somtam	15		Papaya	1
4)	Tamarind	5		Pounded fish	1
5)	Sweet	4		Rice with salt	1
	Why? Becanse of ·····				
1)	Thirsty	37	2)	To like to eat	11
15.	Food are not allowed during menstruation :				
1)	Nothing	115	3)	Coconut water	7
2)	Ice	26	4)	Everything	3
	Why? Because of ·····				
1)	To stop menstruation	24			

2. Therefore, as for the case of ingredients of meals, in comparison with the datum of Table 15-1, in almost all cases, it seems to be true that people generally make preparations for their meals by using ingredients of meals that are ready to hand.

3. The rice that people consumed was almost the glutinous rice. And this glutinous rice was polished in rice polishing mill at village.

4. Usually, glutinous rice was steamed. Ordinary rice was occasionally boiled by adding enough water in some extent case. In this case, people cast away excess water after boiling. This is eating habit in the case of rice.

5. For some reasons, the family that had restricted the kind of daily ingested foodstuffs could very rarely be seen. In the case of the family that restricted, buffalo and swamp eel, etc., could not be regarded as daily consumed foodstuff. But the reason why people did not take buffalo and swamp eel as the daily consumed foodstuff was unknown.

6. The family that had not restricted foodstuff for the purpose of curing sick person could only be seen (in only a few cases). The frequency to get the answer which comprised the restriction of fruit was the highest. This was an unexpected case of survey of this time. But it was unknown why this value of the frequency was the largest one. And also, the numerical value of frequency that sour foods (e.g.— somtam) and some kinds of vegetables were restricted at home, was the secondarily-largest one. And then, it seems to be imagined that people must not supply sick men with buffalo and white buffalo, too.

7. It was observed that most of all mothers who gave their babies their own breast milk. It was presumed that breast milk was deficient, but in this case of deficiency it might be imagined that to buy milk products was economically and financially impossible.

8. The numerical value of frequency on answers that the weaning period had been extended over the terms from 2 years to 4 years of their infant's age, was the greatest one. And also the numerical value of frequency on answers that it had been extended over the terms from 1 year to 2 years of their infant's age, was the secondarily-greatest one. And then, sometimes following answers were obtained. Namely, after their infants were above 5 years of age, mothers wean them. Most of all reasons why infants were weaned were because they had been pregnant next baby.

9. According to the results on survey that carried out concerning the eating habits which mothers used to chew steamed rice and used to give it to their babies and infants, it was observed that most of all mothers either were doing so in this term or had done so. It was recognized that among the mothers who answered "Yes", the shared ratio of mothers' answers that they had been doing so was 49 % in the term of survey. It was also recognized that, among the mothers who answered "suspended", the shared rate of mothers' answers that it was impossible to do so by baby bearing — summing up of those two rates — equal 50 %. The shared rate of the cases of mothers who had suspended those chewing and giving steamed rice under the adequate directions was 1 % among these mothers of 50 %. It seems to us that most of all others did not consider it to be worse.

10. For the question about the kind of foodstuffs restricted during pregnancy, most of all families had answered "Nothing". Among the frequent cases of answers of families who had restricted foodstuffs, there were some cases which meats and furthermore eggs had been restricted. The definite inclinations was not recognized as for the restricted cases of other foodstuffs than meats and eggs as shown in Table 16. Presumably, it indicates change of taste of mother during pregnancy.

11. As for the cases of the foodstuffs that were recognized as the good and advisable one for pregnant women, various kinds of meats, vegetables and fishes were mentioned. In these cases, the answers of families who used to eat every foodstuffs were frequently observed. Frequencies on the cases of answers of families who ingest fruits was the secondarily-largest one next to the former.

12. As for the case of lactating mothers, we could obtain a few answers that the lactating mothers were not subjected to any restriction for ingesting foods. Among these foods that were subject to restrictions for lactating

mothers, the restricted frequencies of *Acacia insuavis* and buffalo meats were in a very higher level. As for the cases of fishes, the restricted frequencies of *Chado* fish and serpent headed fish were kept in a higher level. There were 34 families who had been subjected to restrictions of ingesting beef. The reasons why lactating mothers had been subjected to restrictions of ingesting these foods were mainly ones for the purpose of taking precautions against being fallen ill and for the purpose of taking precautions against being unwell in their uterus.

13. As for the foodstuffs that they regarded as the good and advisable ones for lactating mothers, fishes, beef, pork and vegetables had been mentioned mostly as the good and advisable ones. And also, in this case, it was recognized that the value of answers of families who can eat every one of all foodstuffs was considerably great. Furthermore, the same kinds of foodstuffs as the case of restriction were enumerated in the case of lactating mothers. For instance, these are buffalo, serpent headed fish and so forth. And then, this result became to be beyond our comprehensions.

14. As the most frequently-ingested foodstuffs during menstruation, many women mentioned sour foods. In most cases of these answers, the reasons why sour foodstuffs were taken during menstruation were because of feeling thirsty and because of having a preference for those sour foodstuffs.

15. As for the question about foodstuffs that were not ingested during menstruation, most of women answered that they did not restrict any one of foodstuffs, namely, they could eat every foodstuffs. However, some females answered that they did not have ice and coconut water, even though these cases of answers were rarely observed. The reasons why those females did not have ice and coconut water, were because their menstruation interrupted due to having them.

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