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## 人類生態班

Development and validation of food frequency questionnaire for estimating food and nutrient intakes of people in rural Laos

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### Abstract

Food frequency questionnaire (FFQ) has been developed for estimating food and nutrient intakes at both individual and group levels. The foods listed for FFQ have been chosen based on the data of semi-weighed dietary record (DR) collected in autumn, 2004 from children in Lahanam area, and other qualitative information on the dietary habits of Lao population. The validation study with FFQ and 3-day DR was performed using 113 adult women in Lahanam in summer, 2005. Mean intakes of some food groups were severely overreported in FFQ than in DR although the food list of FFQ almost covered major foods necessary for the assessment of the target population. In order to minimize over/underreporting tendency by food group, the portion sizes in the calculation algorism of FFQ were corrected using the over/underreport ratios of food groups. After this correction, nutrient intakes estimated from FFQ were compared with those assessed with DR at individual and village levels. Mean nutrient intakes of the whole population estimated from FFQ were close to those assessed with DR. However, the correlation coefficients of nutrient intakes between the two methods were null or low (r ranged from -0.14 [% energy of fat] to 0.21 [niacin]). In contrast, the correlation analysis showed a reasonable reproducibility between the two FFQs assessed one-month apart (r ranged from 0.07 [retinol] to 0.60 [carbohydrate]). Further consideration with careful checking of the collected data may be necessary to develop a reliable and usable FFQ for people in rural Laos.

# Introduction

Dietary habit is one of the most important environments related to health status. In this case, habitual intake is necessary to know rather than short-term, for example one-day, intake. In nutritional epidemiologic studies, diet record and 24-hour recall methods are often used to collect dietary information. But these methods are not suitable for collecting data of habitual intake. Food frequency questionnaire (FFQ) is used to collect data of habitual dietary intakes in several nutritional epidemiologic studies over the world. However, the data obtained from FFQ heavily depend both on the quality, i.e., validity, of the questionnaire and on the characteristics of the subjects. It means that FFQ should be developed based on the actual data of dietary habits of the target population, and that the developed FFQ should critically be validated before the use.

Because the reliability of FFQ depends on the memory and understating ability of the subjects, it has usually been developed and used in developed countries. Some research groups have recently started to apply FFQ for studies in developing societies (1-4) although the validation studies are still limited.

This research project needs information of habitual dietary intakes and behaviors including nutrient intake

levels. Therefore, we tried to develop FFQ for Lao people living in rural Laos, and validated it using semi-weighed using 3-day dietary record (DR) as "gold standard". Because the calculation algorism for food and nutrient intakes of the developed FFQ is still under consideration, we describe the temporary results in this report.

### Methods

Basic schedule and scheme of development and validation of FFQ: We followed the basic schedule and scheme for the development and validation of FFQ as described below and shown in Figure 1. Firstly, we analyzed foods consumed among children in Lahanam using the data obtained from 1-day semi-weighed DR in November, 2004, and other qualitative information on the dietary habits of Lao population. We selected major foods commonly consumed, grouped the foods, and made the structure of FFQ. Thirdly, in August, 2005, we randomly selected 113 women aged 19-40 years in Lahanam area, and performed FFQ survey (twice with one-month apart, August and September) and 3-day semi-weighed DR survey for these subjects (DR was done just after the first FFQ survey). The calculation algorism with portion size database of the foods listed in the FFQ was developed referring the data obtained from the DR in 2005. Finally, we validated FFQ using the nutrient intakes estimated from the first FFQ and the data of DR. We checked the reproducibility of FFQ comparing the nutrient intakes estimated from the first and second FFQs.

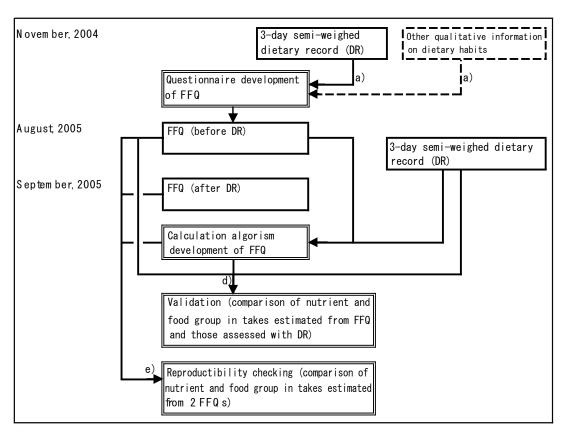


Figure 1 Study scheme and schedule of development and validation of food frequency questionnaire for people in rural Laos

- indicates field survey indicates office work. [ ] indicates work with other information
- a) Food list development using DR data.
- b) Portion size determination of each food.
- c) Determination of correction factor due to over/under reporting foods.
- d) Validation.
- e) Reproducility checking..

Development of FFQ: The foods commonly consumed in Lahanam area were selected based on the data obtained from 3-day semi-weighed DR in November, 2004 for children, and other qualitative information on the dietary habits of Lao population. Then the foods were grouped into food groups considering the food concepts, the cooking methods, and dietary behaviors of the target population. The test-version of FFQ has been made for the validation and reproducibility study in the survey, 2005. The FFQ is shown in Figure 2. Considering both the ability of memory and necessity to know "habitual" intake, we decided to ask frequency of food intake of "the pervious one month".

Development of nutrient calculation algorism of FFQ: In order to estimate food and nutrient intake levels (gram per person per day), portion size was needed for each food asked in FFQ. Seasoning use (gram per person per cooking) for major cooking per time was also needed. These values were obtained from the data collected in the DR in summer, 2005. Using these data, we developed a food and nutrient intake calculation algorism, and then calculated the food and nutrient intakes per person using the data of first FFQ survey.

The ASEAN food composition table, 2005 (5), was used as basic food composition tables in the FFQ. For some foods of whose compositions were missing, the data were obtained from alternative sources such as the Thai food composition tables (6) and the Japanese food composition tables, 5th revised edition (7). The standard recipes to determine the portion size of seasoning in major cooking methods were obtained from the direct observation of some cooking during the field survey in summer, 2005.

Correction of portion size of foods: In many cases, severe over- or under-reporting is seen in a questionnaire survey. The systematic reporting errors in FFQ sometimes happen among specific food groups. Therefore, we examined over- or under-reporting of food intake by food group. The portion sizes were corrected using this over- or under-reporting tendency of each food group, i.e., the ratio of mean intake by FFQ to that by DR (see the result section for more in detail). The corrected portion size was used for the subsequent validation and reproducibility checking process.

Validation and reproducibility checking: The nutrient intake levels at a village level (among 5 villages) and at an individual level estimated from the first FFQ were compared with those assessed with DR. The nutrient intake levels at an individual level estimated from the first and second FFQs were compared each other. Spearman correlation coefficient was used for judging the validity and reproducibility at an individual level. P<0.05 was considered statistically significant.

Two subjects with extremely low energy intake (less than 800kcal/day) in DR were excluded, and then 111 subjects were included in the final analysis (mean age  $\pm$  standard deviation = 25.7  $\pm$  4.4 years).

# Results

Table 1 shows the food list (for 85 foods) used in FFQ. The portion sizes, both original and corrected, are shown in the table. Table 2 shows the portion sizes of three major seasonings in six major cooking methods for meat, fish, and vegetables.

Table 3 shows that the mean food group intakes of DR and the first FFQ, and their ratios. The ratios were used as correction factors of portion sizes to calculate food and nutrient intake levels from FFQ in the subsequent analysis. Some food groups with very low intakes in DR such as nuts and seeds, potatoes, confectioneries, pulses, and milks were severely overreported: more than five times.

Table 4 shows mean energy (kcal/day) and selected nutrient intakes (crude intake per day and energy density values) assessed with DR and those estimated from the first FFQ. In DR, energy intake was significantly higher in the subjects of Kockphork than in them of any other 4 areas (p<0.05). In DR, protein and fat intakes

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Name  Answer your frequency of eating during the last one month of each listed food. 'Rough thinking' is 0 K. P base answer to all the questions. Do not skip. You can om it very small foods.  Fish	ID			voor	2005	h onth	ſ	day	
Answeryour frequency of eating during the last one month of each listed food. "Rough thinking" is 0 K. P base answer to all the questions. Do not skp. You can om it very small foods.  Fish perday perweek permonth  Fish without bones (incl crab, shell prawin)				уса <sub>і  </sub> 	2003	J		uay 1	
P base answer to all the questions. Do notskip. You can om it very small foods.	N am C						divoy	'	L
P base answer to all the questions. Do notskip. You can om it very small foods.		Answer your frequency of eating during the last one	month	ofeach	listed	food "R	ough #	ninking"	is 0 K
Fish			III OIT GT	010001	11000	1004. 1	ough t		DOIL.
Fish		·				ln c l	ıding 11	lever"	
Fish withoutbones (incl crab, shell prawn)	Fish		per	dav	p				<del>- \\ .</del>
Fresh and raw			-					•	
Fresh and heated   2-   1				1	4-6		1		
preserved (incl dried, salted, smoked, canned)   2-							·		
Fish with bones (incl crab, prawin)    Fish with bones (incl crab, prawin)   2-									
Fresh and raw		preserved (not dred, salled, sill oked, canned)		'	470	2-3	ı	Z	\Z
Fresh and heated	Fish	w ith bones (incl crab, prawn)	2-	1	4-6	2-3	1	2	<2
Preserved (incl dried, salted, smoked, canned)   2-		fresh and raw	2-	1	4-6	2-3	1	2	<2
M		fresh and heated	2-	1	4-6	2-3	1	2	<2
Fros		preserved (incl dried, salted, sm oked, canned)	2-	1	4-6	2-3	1	2	<2
Fros	M in		0	1	4 C	0.0	1	0	/0
w ithoutbones		CEC TISN DAII							
With bones   2-	lrog	lw #bouthongo		·					
Fresh meats				·					
Caw, buffa b, pork, goat   2-		M III Dolles	Ζ-	ı	470	2-3	ı	Z	\Z
Caw, buffa b, pork, goat   2-	Fres	h m eats	ner	dav	n	erwee	k	nerm	onth
raw									
medium heated   2-   1   4-6   2-3   1   2   < 2							1		
C hicken, duck, goose, wild bird  2- 1 4-6 2-3 1 2 <2  R at, rabbit, wild an im a l  2- 1 4-6 2-3 1 2 <2  O ther an im al foods  per day  per week  per month  D ried meat  2- 1 4-6 2-3 1 2 <2  Sausage (Sa kok)  2- 1 4-6 2-3 1 2 <2  B bod, liver  2- 1 4-6 2-3 1 2 <2  raw  heated  2- 1 4-6 2-3 1 2 <2  Insect (Chinai, mengda, takaten)  2- 1 4-6 2-3 1 2 <2  Insect (Chinai, mengda, takaten)  per day  per week  per month  G reen leafy vegetables (moming g bry, spinach, mint, pumpkin leaf, yod mak-u, tammin, katin, others)  Young papaya  2- 1 4-6 2-3 1 2 <2  Tom ato  2- 1 4-6 2-3 1 2 <2  Cucum ber  2- 1 4-6 2-3 1 2 <2  To green beans (Mac tua)		m edium heated	2-	1	4-6		1		
R at, rabb it, w ild anim al         2-         1         4-6         2-3         1         2         <2           0 ther anim al foods         per day         per week         perm onth           D ried meat         2-         1         4-6         2-3         1         2         <2		w e ll heated	2-	1	4-6	2-3	1	2	<2
O ther an mal foods         per day         per week         per month           D ried meat         2-         1         4-6         2-3         1         2         <2	C h ic	ken, duck, goose, wild bird	2-	1	4-6	2-3	1	2	<2
D ried meat	Rat,	rabbit, wild an in al	2-	1	4-6	2-3	1	2	<2
Sausage (Sakok)       2-       1       4-6       2-3       1       2       <2	0 the	eranim al foods	per	day	р	erwee	k	perm	onth
B bod, liver	Drie	d m eat	2-	1	4-6	2-3	1	2	<2
raw   2-	Sau	sage (Sakok)	2-	1	4-6	2–3	1	2	<2
heated   2-   1   4-6   2-3   1   2   < 2     Insect (Chinai, mengda, takaten)   2-   1   4-6   2-3   1   2   < 2     Egg   2-   1   4-6   2-3   1   2   < 2     Vegetables   per day   per week   per month     Green leafy vegetables (morning g bry, spinach, mint, pumpkin leaf, yod mak-u, tammin, katin, others)   Young papaya   2-   1   4-6   2-3   1   2   < 2     Tomato   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Green beans (Mac tua)   2-   1   4-6   2-3   1   2   < 2     Green beans (Mac tua)   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Green beans (Mac tua)   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Green beans (Mac tua)   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2     Cucum ber   2-   1   4-6   2-3   1   2   < 2	Bloc	d, liver	2-	1	4-6	2–3	1	2	<2
Insect (Chinai, mengda, takaten)   2-				1			1		
Egg         2-         1         4-6         2-3         1         2         <2           Vegetables           G reen leafy vegetables (moming g bry, spinach, mint, green leafy vegetables (moming g bry, spinach, green leafy vegetables (moming g bry, spinach, green leafy vegetables (moming g bry, spinach,									
Vegetables         per day         per week         per month           G reen leafy vegetables (morning g bry, spinach, mint, pumpkin leaf, you mak-u, tammin, katin, others)         2-         1         4-6         2-3         1         2         <2		ct (Chinai, m engda, takaten)		-			_		
G reen leafy vegetables (moming g bry, spinach, mint, pumpkin leaf, you mak-u, tammin, katin, others)       2-       1       4-6       2-3       1       2       <2	Egg		2-	1	4-6	2–3	1	2	<2
G reen leafy vegetables (moming g bry, spinach, mint, pumpkin leaf, you mak-u, tammin, katin, others)       2-       1       4-6       2-3       1       2       <2									
pum pkin leaf, yod m ak-u, tam m in, katin, others)       Young papaya     2-     1     4-6     2-3     1     2     <2									
Young papaya       2-       1       4-6       2-3       1       2       <2			2-	1	4-6	2-3	1	2	<2
Tom a to       2-       1       4-6       2-3       1       2       <2         C ucum ber       2-       1       4-6       2-3       1       2       <2         G reen beans (M ac tua)       2-       1       4-6       2-3       1       2       <2	-	-	2	1	16	2.2	1	n	/0
C ucum ber       2-       1       4-6       2-3       1       2       <2         G reen beans (M ac tua)       2-       1       4-6       2-3       1       2       <2							_		
G reen beans (M ac tua) 2- 1 4-6 2-3 1 2 <2				-					
2 1 40 20 1 Z Z									
	- 55	умпс		'	7 0	2 0		۷	\ \ \

Figure 2 The developed food frequency questionnaire for Lao people (test-version)

Vegetables (continued)	-	day		erwee	k	perm	
Bam boo shoot	2-	1	4-6	2–3	1	2	<2
M ushroom	2-	1	4-6	2-3	1	2	<2
Bean sprouts	2-	1	4-6	2-3	1	2	<2
Pumpkin	2-	1	4-6	2-3	1	2	<2
Zucch in i	2-	1	4-6	2–3	1	2	<2
Banana flower	2-	1	4-6	2-3	1	2	<2
Cabbage	2-	1	4-6	2-3	1	2	<2
Lettuce	2-	1	4-6	2–3	1	2	<2
C a rro t	2-	1	4-6	2–3	1	2	<2
R iverweeds							
Com	2-	1	4-6	2-3	1	2	<2
Sweetpotato	2-	1	4-6	2-3	1	2	<2
French) potato	2-	1	4-6	2–3	1	2	<2
Yam	2-	1	4-6	2-3	1	2	<2
Taro	2-	1	4-6	2-3	1	2	<2
Cassava	2-	1	4-6	2-3	1	2	<2
Fru its	per	day	р	erwee	k	permont	
C itrus fruits (O range, green mango, green tamarind,	2-	1	4-6	2-3	1	2	<2
R ipped papaya	2-	1	4-6	2-3	1	2	<2
R ipped m ango	2-	1	4-6	2-3	1	2	<2
Banana as fruits	2-	1	4-6	2-3	1	2	<2
Mebn, Watermebn	2-	1	4-6	2-3	1	2	<2
A llothers	2-	1	4-6	2-3	1	2	<2
N u ts	per	day	р	erwee	k	perm	ont
Nuts, Peanuts	2-	1	4-6	2–3	1	2	<2
Sweets	per	day	р	erwee	k	perm	ont
Lao cakes	2-	1	4-6	2-3	1	2	0
Boiled	2-	1	4-6	2-3	1	2	0
S team ed	2-	1	4-6	2-3	1	2	0
G rilled	2-	1	4-6	2-3	1	2	0
Cakes	2-	1	4-6	2-3	1	2	0
B iscu it	2-	1	4-6	2-3	1	2	0
Baked banana	2-	1	4-6	2-3	1	2	0
Fried banana	2-	1	4-6	2–3	1	2	0
Desserts (Nam warn)	2-	1	4-6	2-3	1	2	0
lce-cream	2-	1	4-6	2-3	1	2	0
Jerry	2-	1	4-6	2-3	1	2	0
Packed snacks (Kanom kieb kum)	2-	1	4-6	2-3	1	2	0
Candy	2-	1	4-6	2-3	1	2	0

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Beverages	perd	lay	perweek				]
Drinking water	2-	1	4-6	2-3	1	<1	Ì
	Well Pumpe	d	Ran	R	iver	Ρip	ed
	Во	iled		Νo	tboile	d	
Softdrinks	2-	1	4-6	2-3	1	<1	
Tea	2-	1	4-6	2-3	1	<1	
Coffee	2-	1	4-6	2-3	1	<1	
0 va ltin	2-	1	4-6	2-3	1	<1	
Sugarcane ji ice	2-	1	4-6	2-3	1	<1	
C oconut ju ice	2-	1	4-6	2-3	1	<1	
Nam monoy/nam phaknok	2-	1	4-6	2-3	1	<1	
Fresh fruit juice	2-	1	4-6	2-3	1	<1	
Soyam ik	2-	1	4-6	2-3	1	<1	1
M ik (fresh)			1				1
Mik (powder)	2-	1	4-6	2-3	1	<1	t
Condensed m ik	2-	1	4-6	2-3	1	<1	
Yogurt	2-	1	4-6	2-3	1	<1	
A kohol	perd	lay		perv	veek		
Beer	2-	1	4-6	2-3	1	<1	
Rice wine (Lao sato)	2-	1	4-6	2-3	1	<1	
Rice wine (Lao hai)							
Liquor (Lao Lao, Laokhao)	2-	1	4-6	2-3	1	<1	
Lao det	2-	1	4-6	2-3	1	<1	
W hisky	2-	1	4-6	2-3	1	<1	
			Incl	iding "1	lever"	<u></u>	
N ood le ∕b read	perd	lay	р	erwee	k	perr	nonth
N ood le	2-	1	4-6	2-3	1	2	<2
R ice	2-	1	4-6	2-3	1	2	<2
W heat	2-	1	4-6	2-3	1	2	<2
Тарюса	2-	1	4-6	2-3	1	2	<2
Bread	2-	1	4-6	2-3	1	2	<2
with condensed mik	2-	1	4-6	2-3	1	2	<2
w ith pate	2-	1	4-6	2–3	1	2	<2
R ice	perd	lay	р	erwee	k	perr	nonth
Non sticky rice	2-	1	4-6	2–3	1	2	<2
S ticky rice	2-	1	4-6	2-3	1	2	<2
		How	many	ballsp	erday		bal

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Similed   2-   1   4-6   2-3   1   2   < 2   < 2	l eat		per	day	p	erwee	ek	permonth		
3 rilled   2 -	Raw (Laap, koy, s	saephear)	2-	1	4-6	2-3	1	2	<2	
30 ibid Soup, curry   2-	S team ed		2-	1	4-6	2–3	1	2	<2	
Stir fried	G rilled		2-	1	4-6	2-3	1	2	<2	
Deep fried	Boiled (Soup, cur	<b>y</b> )	2-	1	4-6	2-3	1	2	<2	
Per day	S tir fried		2-	1	4-6	2-3	1	2	<2	
Raw (Laap, koy)    2-	Deep fried		2-	1	4-6	2-3	1	2	<2	
Steamed   2-   1   4-6   2-3   1   2   < 2	Fish		per	day	p	erwee	k	perm	onth	
Seriled   2-	Raw (Laap, koy)		2-	1	4-6	2-3	1	2	<2	
So iled (Soup, curry)   2-	S team ed		2-	1	4-6	2-3	1	2	<2	
Striffied	G rilled		2-	1	4-6	2-3	1	2	<2	
Deep fried   2-	Boiled (Soup, cur	y)	2-	1	4-6	2–3	1	2	<2	
Vegetables	S tir fried		2-	1	4-6	2-3	1	2	<2	
Raw (Laap)   2-	Deep fried		2-	1	4-6	2–3	1	2	<2	
Steamed   2-	Vegetables		per	day	p	erwee	k	perm	onth	
Striffied   2-	Raw (Laap)		2-	1	4-6	2-3	1	2	<2	
Bo iled (Soup, curry)   2- 1 4-6 2-3 1 2 <2	S team ed		2-	1	4-6	2–3	1	2	<2	
Stir fried   2-   1   4-6   2-3   1   2   < 2	G rilled		2-	1	4-6	2-3	1	2	<2	
Deep fried   2-   1   4-6   2-3   1   2   <2	Boiled (Soup, cur	ry)	2-	1	4-6	2-3	1	2	<2	
Do il/fat	S tir fried		2-	1	4-6	2-3	1	2	<2	
Dil/fat for frying	Deep fried		2-	1	4-6	2–3	1	2	<2	
Dil/fat for frying	0 il∕fat		per	dav	Т г	erwee	ek	pern	nonth	
Vegetable oil   2-   1   4-6   2-3   1   2   <2	*	Lard								
Sweets   2-   1   4-6   2-3   1   2   < 2	, ,	Vegetable oil	2-	1	4-6	2–3	1	2	<2	
Sweets   2-   1   4-6   2-3   1   2   < 2	Foods cooked w it	h coconuts	ner	dav		nerwee	a k	nern	ı onth	
Dishes   2-   1   4-6   2-3   1   2   <2			-							
Salty sauce with water crab withoutheating   2-   1   4-6   2-3   1   2   <2								_		
Very   Relati   Medi   Relati   Very   much   vely   um   vely   few   Very   much   vely   um   vely   few   wely   few   vely   much   vely   um   vely   few   vely   few				'	4 0		'		\ \ \ \ \	
m uch   ve ly   um   ve ly   few	Salty sauce w ith w	ater crab w ithoutheating	2-	1	4-6	2–3	1	2	<2	
m uch   ve ly   um   ve ly   few	Hotpepper (chili)	use	IV e rv	Rebt	iM edi	Relat	iVerv	Ī		
Very   Relati   Medi   Relati   Very   much   vely   um   vely   few										
m uch   ve   y   um   ve   y   few	Garlic use					1				
2-     1     4-6     2-3     1     2     <2										
2-     1     4-6     2-3     1     2     <2	II aa #aaaa aa kum u	a if in nowhat but not listed for	da baya an	n o o ko o		1		•		
2- 1 4-6 2-3 1 2 <2 2- 1 4-6 2-3 1 2 <2	o se litese colum n	וי ווו אטרומווג טענווטנדוואנפט, 100				2-3	1	2	<2	
2- 1 4-6 2-3 1 2 <2				1						
				_						

. our cour	ood list used in the tood tree e I lood name	Lood sub name	Parties	stze (g)	Lable 1 (C	e Loodiname	Lood sub name	Portons	dze (c)
	e Toodhame	i ood sub name	Original	Corrected*	1 000 0000	e i counane	r ood sub name	Original	Corrected
F001	Hish without bones	Fresh and raw	32	27.7	F075	Heer		100	100.0
F002		Fresh and beared	32	27.7	E076	Rice wine (Lao sar	n)	20	20.0
F003		Preserved	32	27.7	F077	Rice wine (Lao hai	)	20	20.0
F004	Fish with bones	Freshlandraw	19	16.5	F073	Liquor (Lao Lao, b	aukirau)	20	20.0
F005		Fresh and heated	19	16.5	F079	Lao det		20	20.0
F006		Preserved	19	16.5	F080	Whisky		20	20.0
F007	Minced fish ball		19	16.5	F081	Noodic	Hite	81	/3.9
F008	Frog	Without bones With bones	34 34	29.5 29.5	F082		Wheat Tapines	96 At	87.6 73.9
F010	Caw, bullalo, pork, goat		29	25.2	F064	Dread	With condensed milk	57	52.0
F011	Caw, curaio, porki goat	Medium heated	29	25.2	F005	bread	With "pate"	57	52.0
F012		Well heated	20	26.2	F085	Non sticky rice	Will pale	200	182.6
F013	Chicken, duck, goose, w		29	25.2	F087	Sticky rice		200	182.5
H014	Rat, rabbit, wild animal		8	7.0	F088	Meat: Raw (Laap,	kny saophoar)	Secta	
F015	Dried most		25	21.8	E080	Meat: Steamed		See to	ble 2
F016	Sausage		29	25.2	F090	Mest: Grilled		See to	ble 2
F017	Blood, liver	Raw	10	8.7	F091	Mest: Boiled (Soup	o, curry)	See to	ble 2
1 018		Heated	10	0.7	1 092	Meat: Stir fried		Gee to	
H019	Insect		48	41.8	F093	Meat: Deep filed		See ta	
F020	Hgg		43	18.9	F094	Hish: Haw (Leap, k	roy)	Secta	
F021	Green leafy vegetables		19	13.6	F095	Fish Steamed		Secreta	
F022	Young papaya Tomato		95	67.8	F098	Fish: Grilled		See to	
F023 F024	Tomato Cucumber		13	9.3 62.8	F097	Fish: Boiled (Soup Fish: Stirlined	(cury)	See to See to	
F025	Green beans		53	37.8	F099	Hish: Deep fried		See 6	
F026	Egoplant		35	25.0	F100	Vog.: Raw (Laap)		Sec to	
F027	Hamboo shoot		100	/1.4	F101	Vog.: Steamed		Secta	
F028	Mushroom		73	52.1	Г102	Veg.: Grilled		See to	
Г029	Dean sprouts		10	7.1	Г103	Veg.: Boiled (Sou:	curv)	See to	
F000	Pumpkin		38	27.1	F101	Veg.: Stir fried		See to	ble 2
F031	Zucchini		26	18.6	F105	Veg.: Deep fried		See to	ble 2
F032	Hanana fower		13	9.3	F106	Olitation trying: La	rd	4.9	5.9
F033	Cabbage		28	20.0	F107	Olitation trying: Vo	getable oil	4.9	5.9
E034	Lettuce		28	20.0	E103	Foods cooked with	researche Sweets	Notin	seed
F005	Carrot		28	20.0	Г109	Foods cooked with	rcoconcts: Dishes	Note	ised
F038	River weeds		15	10.7	F110		ater crab without heating	Note	ised
F037	Corn		19	17.3	F111	Hot pepper (chill) u	ise .	1.7	1.2
F038	Sweet potato		73	9.6	F112	Carlo use		2.8	2.0
L038	(French) potato		73	9.6			ermined by multiplying the we		RITTQ)
1 040	Yam		73						
				9.0			portion size. The corrected po	rtion size was us	sed for the
F041	Laro		73	9.6		ladie 2 to the original p iculation shown in Tab		rtion size was u	sed for the
F042	Cassava		73 73	9.6 9.6				etton size was u	sed for the
H042 F043	Cassava Citrus fruits		/3 /3 12	9.6 9.6 4.2				rtion size was u	sed for the
F043 F043 F044	Cassava Citus fuits Ripped papaya		73 73 12 65	9.6 9.6 4.2 22.7				rtion size was u	sed for the
F043 F043 F044 F045	Cassava Citrus fruits Ripped papaya Ripped mango		73 73 12 65 65	9.6 9.6 4.2 22.7 22.7				ition size was u	sed for the
F043 F043 F044 F045 F045	Cassava Citrus finits Ripped papaya Ripped mango Danana as fruts		73 73 12 65 65	9.6 9.6 4.2 22.7 22.7 27.8				ition size was u	sed for the
F042 F043 F044 F045 F046 F047	Cassava Citrus finits Ripped papaya Ripped mango Uamera as truts Moion, Watermeion		73 73 12 65 65 65 30	9.6 9.6 4.2 22.7 22.7 27.9 42.9	nutrient ca	Iculation shown in Tab	nie 3.		
F043 F043 F044 F045 F045	Cassava Citrus finits Ripped papaya Ripped mango Danana as fruts		73 73 12 65 65	9.6 9.6 4.2 22.7 22.7 27.8	nutrient ca	Iculation shown in Tat			
F042 F043 F044 F045 F046 F047	Cassawa Citrus finits Ripped papaya Ripped mango Damarra sa fruits Meino, Watermeion All others	Drohad	73 73 12 65 65 65 00 123 65	9.6 9.6 4.2 22.7 22.7 27.8 42.9 72.7	nutrient ca	Iculation shown in Tat	nie 3.		
F042 F043 F044 F045 F047 F047 F048 F049	Cassava Citos finits Ripped papaya Ripped mango Daniera as fruts Moino, Watermeion All others Nuts, Peanirts	Droked Stoamod	73 73 12 65 65 00 123 65 22	9.6 9.6 4.2 22.7 22.7 27.8 42.9 72.7 3.0	nutrient ca	deviation shown in Tab ention size of 3 major s ables	nie 3.		neal, fish,
F042 F043 F044 F045 F047 F048 F049 F050	Cassava Citos finits Ripped papaya Ripped mango Daniera as fruts Moino, Watermeion All others Nuts, Peanirts		73 73 12 65 65 00 123 65 27	9.6 9.6 4.2 22.7 22.7 27.8 42.9 27.7 3.0 0.8	Lable 2 Ps and veget	deviation shown in Tab ention size of 3 major s ables	nic 3. casonings in each cooking m	ethod used for n	neal, fish,
F042 F043 F044 F045 F046 F047 F048 F049 F050 F051	Cassava Citos finits Ripped papaya Ripped mango Daniera as fruts Moino, Watermeion All others Nuts, Peanirts	Sleamed	73 73 12 65 65 00 123 66 22 74	9.6 9.6 4.2 22.7 22.7 27.9 42.9 72.7 3.0 0.6	Lable 2 Ps and veget	iculation shown in Tat ortion size of 3 major's ables orthod*	nic 3. casonings in each cooking m	othed used for a	neal, fish,
F042 F043 F041 F045 F047 F047 F048 F049 F050 F051 F052	Cassava Citrus finits Ripped papaya Ripped mango Danerra as fruits Meion, Watermeion All others Nuits, Poanuts Lass release	Sleamed	73 73 12 65 65 00 123 66 22 74 74 74 74	9.6 9.6 4.9 22.7 22.7 27.8 42.9 27.7 3.0 0.8 0.6	Lable 2 Pt and veget	iculation shown in Tat ortion size of 3 major's ables orthod*	casanings in each cooking m Seasonings	Portions Original** 1.0 0.5	neal, fish,
F042 F043 F044 F045 F047 F048 F049 F050 F050 F050 F050 F050 F050 F050 F05	Cassava Citrus finits Ripped papaya Ripped mango Danerra as fruits Moion, Watermoion All others Nuis, Poannts Lass reakase Cakes	Sleamed	73 73 12 85 65 00 123 6b 22 74 74 74 74 30	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.8 0.6 0.8 0.8	Lable 2 Pt and veget	iculation shown in Tat ortion size of 3 major's ables orthod*	casonings in each coaking m Seasonings Sugar Air consto Sat	Portion: Original** 1.0 0.5 0.5	neal, fish,
F042 F043 F044 F045 F046 F047 F048 F048 F050 F051 F052 F053 F054 F056 F056	Cassava Citrus finits Ripped papaya Ripped mango Danerra as truts Melon, Watermelon All others Nuts, Peanuts Lass redeas  Cakes Discuit Dated banana Hide banana	Sleamed	73 73 12 65 65 00 123 66 22 74 74 74 74 30 60 80	9.6 9.6 4.2 22.7 22.7 27.9 42.9 27.7 3.0 0.6 0.6 0.6 0.3 0.7	Lable 2 Pt and veget	iculation shown in Tat ortion size of 3 major's ables orthod*	casanings in cach cooking m  Scasonings  Sugar  Aji tempto Satt  Sugar	Portion: Odginal** 1.0 0.5 0.5 1.0	neal, fish,
F042 F043 F041 F045 F047 F048 F049 F050 F050 F051 F052 F053 F054 F055 F056 F056 F056 F056 F056 F056 F056	Cassava Clinus finits Ripped papaya Ripped mango Danerra se fruits Moion, Watermoion All others Nuits, Poannis Lass release  Cakes Discut Uaked banana Erico banana Dossorts (Nam warn)	Sleamed	73 73 12 65 65 00 123 66 22 74 74 74 30 00 80	9.6 9.6 4.2 22.7 27.9 42.9 27.7 3.0 0.6 0.6 0.6 0.8 0.7 0.7	Lable 2 Pk and veget Cooking n Raw (Lear	iculation shown in Tat ortion size of 3 major's ables orthod*	casonings in each cooking m  Seasonings  Sugar Air consto  Satt  Sugar Ajhomato	Portions Original** 1.0 0.5 0.6 1.0 0.6	neal, fish,
F042 F043 F041 F045 F046 F046 F048 F048 F049 F050 F051 F052 F053 F054 F056 F056 F056 F056 F056 F056 F056 F056	Cassava Citrus finits Ripped papaya Ripped mango Danerra as fruits Moion, Watermoion All others Nuts, Poannts Lass reslace  Cakes Discut Dated banana Hider banana Desserts (Nam warn) lice orean	Sleamed	73 73 73 12 65 65 00 123 66 22 74 74 74 30 00 80 157 50	9.6 9.6 4.2 22.7 27.9 42.9 72.7 3.0 0.8 0.6 0.6 0.3 0.7 0.7	Lable 2 Ps and veget Coolding in Raw (Las)	iculation shown in Tat ortion size of 3 major's ables orthod*	casanings in each cooking m Seasonings Sugar Airomoto Sat Sugar Ajhomato Sati	Portions Original** 1.0 0.5 0.5 1.0 0.5 0.5	neal, fish,
F042 F043 F044 F045 F047 F048 F048 F059 F050 F050 F050 F050 F050 F050 F050	Cassava Clinus finits Ripped papaya Ripped mango Danaria se fruits Molon, Watermolon All others Nuts, Poanris I ser release  Cakes Discuit Uaked banana Edor banana Desserts (Nam warn) Incompan	Sleamed	73 73 73 73 19 85 85 00 123 66 27 74 74 74 74 90 00 80 157 50	9.6 9.6 4.2 22.7 22.7 27.9 42.9 72.7 3.0 0.6 0.6 0.6 0.3 0.7 0.7	Lable 2 Pk and veget Cooking n Raw (Lear	iculation shown in Tat ortion size of 3 major's ables orthod*	casonings in each cooking m  Seasonings  Sugar Aircmoto Satt Sugar Ajunato Sugar Ajunato Sugar Ajunato Sugar	Portion Original 1.0 0.5 0.5 0.5 0.5 0.0 0.0	neal, fish,
F049 F043 F041 F045 F045 F046 F046 F048 F048 F046 F050 F050 F051 F055 F055 F056 F056 F056 F058 F058	Cassava Citrus finits Ripped papeys Ripped mango Danerra se truts Molon, Watermolon All others Nuts, Peanirts I san redeac  Cakes Discuit Daked banana Hido banana Desserts (Nam warn) Incomosan Jeny Packed snacks	Sleamed	73 73 73 73 73 73 74 85 85 90 123 66 22 74 74 74 74 90 90 80 157 50 20	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.8 0.6 0.6 0.3 0.7 0.7 1.3 0.4 0.4	Lable 2 Ps and veget Coolding in Raw (Las)	iculation shown in Tat ortion size of 3 major's ables orthod*	casonings in each cooking m  Seasonings  Sugar Air consto Sat Sugar Ajhomato Suit Sugar Ajhomato Sujar Ajhomato	Portion: Originar* 1.0 0.5 0.5 0.5 0.6 0.6 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7	neal, fish,
F042 F043 F043 F045 F045 F046 F048 F048 F048 F050 F051 F054 F055 F056 F056 F056 F056 F056 F056 F056	Cassava Citrus finits Ripped papaya Ripped mango Danerra es truts Molon, Watermolon All others Nuts, Poanuts Las restase  Cakes Discuit Daked banans Erico banans Erico banans Lossorts (Nam warn) hor manu Packed snacks Candy	Sleamed	73 73 73 12 65 65 00 123 66 22 74 74 74 30 00 80 157 50 50 20	9.6 9.6 4.2 22.7 22.7 27.9 42.9 27.7 3.0 0.6 0.6 0.6 0.3 0.7 0.7 1.3 0.4 0.4 0.4	Lable 2 Pc and veget Decking in Rew (Lear Steamed	action shown in Tat ortion size of 3 major's ables nethod" p. koy)	casanings in each cooking m  Seasonings  Sugar Aji temoto Satt Sugar Ajbomoto Sult Sugar Asi conoto Sult Sugar Asi conoto Satt	Portion: Original** 1.0 0.5 0.5 0.5 0.0 0.5 0.0 0.5 0.0	neal, fish,
F042 F043 F043 F045 F045 F046 F048 F046 F050 F050 F050 F054 F055 F056 F056 F056 F056 F056 F056 F056	Cassava Citrus finits Ripped papaya Ripped mango Damena as huts Moion, Watermoion All others Nuts, Poannts I ser release  Cakes Discut Ualked banana Price banana Desserts (Nam warn) huc mean Jeny Packed snacks Candy Soft didniss	Sleamed	73 73 73 73 73 73 74 75 76 76 77 74 74 74 70 90 80 157 50 20 6	9.6 9.6 4.2 22.7 27.9 42.9 27.7 3.0 0.6 0.6 0.6 0.6 0.7 0.7 1.3 0.4 0.4 0.4	Lable 2 Ps and veget Coolding in Raw (Las)	action shown in Tat ortion size of 3 major's ables nethod" p. koy)	casanings in each cooking m  Seasonings  Sugar Ail consto Satt Sugar Ajhomato Sult Sugar Ajinomato Sult Sugar Ajinomato Sult Sugar Ajinomato Sult Sugar Ajinomato Sult Sugar	Portions Original** 1.0 0.5 0.6 1.0 0.6 0.6 0.0 0.0 0.0 0.0 0.0	neal, fish,
F042 F043 F044 F045 F045 F047 F048 F049 F050 F050 F050 F054 F056 F056 F056 F056 F056 F056 F056 F056	Cassava Citrus finits Ripped papaya Ripped papaya Ripped mango Danera sa fruits Moion, Watermoion All others Nuts, Poannts I sas estase  Cakes Discuit Daked banana Hidor banana Desserts (Nam warn) Increment Jeny Packed snacks Condy Soft didnis Loa	Sleamed	73 73 73 73 73 73 73 85 65 90 123 66 22 74 74 74 30 90 80 197 50 50 20 6	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.6 0.6 0.6 0.7 0.7 1.3 0.4 0.4 0.2 0.0 Not used	Lable 2 Pc and veget Decking in Rew (Lear Steamed	action shown in Tat ortion size of 3 major's ables nethod" p. koy)	casonings in each cooking m  Seasonings  Sugar Air consto Sat  Sugar Ajhometo Sugar Air consto Sugar Air consto Sugar Air consto Sugar Air consto Sugar	Portion:  Original**  1.0 0.5 0.6 0.6 0.6 0.0 0.0 0.0 0.6 3.8 0.6	neal, fish,
F042 F043 F043 F045 F046 F046 F048 F048 F048 F050 F050 F050 F051 F055 F055 F056 F056 F056 F056 F056 F056	Cassava Citrus finits Ripped papaya Ripped mango Danarra as truts Molon, Watermolon All others Nuts, Peanirts I san rediase  Cakes Discuit Daked banana Erico banana Desserts (Nam warn) Incr onsan Jeny Packed snacks Candy Soft didnits Loa Coffee	Sleamed	73 73 73 73 73 73 74 85 65 90 123 66 22 74 74 74 74 30 90 80 167 50 20 6 100 100	9.6 9.6 4.2 22.7 22.7 22.8 42.8 72.7 3.0 0.6 0.6 0.6 0.7 0.7 1.3 0.4 0.4 0.4 0.2 0.0 Not used Not used	Lable 2 Pk and veget Coolding in Raw (Las) Steamed Grilled	action shown in Tat ortion size of 3 major's ables nethod" p. koy)	casonings in each coaking m  Seasonings  Sugar Airconoto Satt Sugar Ajinomoto Satt Sugar Ajinomoto Satt Sugar Ajinomoto Satt Sugar Ajinomoto Satt Sugar	Portion Original 1.0 0.5 0.5 0.0 0.0 0.0 0.0 0.5 0.5 0.5 0	neal, fish,
F042 F043 F043 F044 F045 F046 F046 F048 F048 F050 F050 F051 F054 F055 F056 F056 F059 F060 F060 F060 F063 F063 F064 F063 F064 F065	Cassava Citrus finits Ripped papaya Ripped mango Danerra se truts Molon, Watermolon All others Nuts, Poanuts Lass redaxe  Cakes Discuit Dated banana Hole banana Desserts (Nam warn) her orean Jeny Packed snacks Candy Soft didnies Loa Coffee Ovalin	Sleamed	73 73 73 73 73 73 75 85 85 90 123 66 22 74 74 74 74 79 90 90 80 167 50 20 6 100 100 18	9.6 9.6 4.2 22.7 22.7 27.9 42.9 27.7 3.0 0.8 0.6 0.6 0.7 1.3 0.7 0.7 1.3 0.4 0.4 0.1 0.2 0.0 Not used Not used Not used	Lable 2 Pc and veget Decking in Rew (Lear Steamed	action shown in Tat ortion size of 3 major's ables nethod" p. koy)	casonings in each cooking m  Seasonings  Sugar Airconoto Sat Sugar Ajhomato Sujar Ajhomato Sat Sugar	Portion: Original** 1.0 0.5 0.5 0.5 0.0 0.6 0.7 0.0 0.0 0.0 0.0 0.0 0.5 0.5 1.0 0.7 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	neal, fish,
F042 F043 F043 F045 F045 F046 F046 F048 F048 F046 F050 F050 F056 F056 F056 F056 F060 F060	Cassava Citrus finits Ripped papaya Ripped papaya Ripped mango Danerra es truts Moion, Watermoton All others Nuts, Poannts Las restave  Cakes Discuit Daked banana Hide banana Desserts (Nam warn) had mana Jeny Packed snacks Candy Soft didniks Loa Coffee Ovalin Sugarcane juice	Sleamed	73 73 73 73 12 65 65 00 123 66 22 74 74 74 30 00 80 157 50 20 6 100 100 100 180 100 100 100	9.6 9.6 4.2 22.7 22.7 22.7 27.9 42.9 22.7 3.0 0.6 0.6 0.6 0.7 1.3 0.7 0.7 1.3 0.4 0.4 0.2 0.0 Not used Not used Not used	Lable 2 Pk and veget Coolding in Raw (Las) Steamed Grilled	action shown in Tat ortion size of 3 major's ables nethod" p. koy)	casanings in each cooking m  Seasonings  Sugar Aji temoto Satt Sugar Ajbometo Sult Sugar Aji temoto Satt Sugar Aji temoto Sott Sugar Aji temoto Sott Sugar Aji temoto Sott Sugar Aji temoto Sot	Portion: Original** 1.0 0.5 0.5 0.5 0.0 0.6 0.6 0.0 0.6 0.6 0.6 0.5 0.5 0.0 0.0 0.6 0.5 0.5 0.5 0.5 0.5 0.0 0.0 0.6 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	neal, fish,
F042 F043 F043 F045 F045 F045 F048 F048 F046 F050 F050 F050 F050 F050 F050 F050 F05	Cassava Citrus finits Ripped papaya Ripped mango Danerra se truts Moion, Watermeion All others Nuis, Poanuts I ser release  Cakes Discut Ualced banama Price banama Desserts (Nam warn) incremann Jeny Packed smacks Candy Soft didnits I ca Coffee Ovatin Sugarcane juice Coconut i rice	Steamed Orlind	73 73 73 73 73 73 73 74 65 65 90 123 66 74 74 74 90 90 157 50 100 100 100 18 100 100	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.8 0.6 0.8 0.9 0.7 0.7 1.3 0.4 0.4 0.4 0.2 0.0 Not used Not used Not used Not used Not used	Lable 2 Ps and veget Cooking in Raw (Las) Siteamed Grilled Holled (Se Stir fried	ortion size of 3 major s ables nothed" p. key)	ossonings in each cooking m Seasonings Sugar Aji remote Sat Sugar Ajhomate Sujar Ajhomate Sugar Aji remote Sat Sugar Aji remote Sat Sugar Aji remote Sat Sugar Ajhomate Sugar Ajhomate Sugar Ajhomate Sugar Ajhomate Sugar Ajhomate Sugar Ajhomate Sugar Aji remote Sat	Portions Original** 1.0 0.5 0.5 0.5 0.0 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	neal, fish,
F042 F043 F043 F045 F045 F046 F048 F048 F048 F050 F050 F050 F050 F050 F050 F050 F05	Cassava Clinus finits Ripped papaya Ripped mango Daniera se fruits Molon, Watermelon All others Nuts, Poaniris Lances Cakes Discuit Uaked banana Edoc banana Dossorts (Nam warn) hor man Jeny Packed snacks Candy Soft drinks Loa Coffee Ovalin Sugarcane juice Coconut Lince Nam monoy / nam phake	Steamed Orlind	73 73 73 73 73 73 74 85 65 90 123 66 27 74 74 74 74 79 90 90 80 157 50 20 6 100 100 100 100 100 100	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.6 0.6 0.6 0.6 0.7 0.7 1.3 0.4 0.4 0.4 0.4 0.2 0.0 Not used Not used Not used Not used Not used Not used	Lable 2 Pk and veget Coolding in Raw (Las) Steamed Grilled	ortion size of 3 major s ables nothed" p. key)	casonings in each cooking m  Seasonings  Sugar Airemote Satt Sugar Airemote Satt Sugar Airemote Sat Sugar Airemote Sat Sugar Airemote Sat Sugar Airemote Sot Sugar	Portion Original 1.0 0.5 0.6 0.0 0.0 0.0 0.6 2.8 0.5 1.2 0.5 0.5 0.5 1.2 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	neal, fish,
F042 F043 F043 F044 F045 F046 F046 F046 F048 F048 F048 F049 F050 F051 F052 F054 F055 F058 F058 F058 F058 F058 F068 F066 F067 F068 F068 F068 F068 F068 F068 F068 F068	Cassava Citrus finits Ripped papaya Ripped mango Danara as truts Molon, Watermolon All others Nuts, Peanirts I san redase  Cakes Discuit Daked banana Erico banana Desserts (Nam warn) Incr orden Jeny Packed snacks Candy Soft drinks Loa Coffee Ovalin Sugarcane juice Coconut Lifice Nam monory / nam phalo Fresh finit juice	Steamed Orlind	73 73 73 73 73 73 74 85 85 90 123 66 22 74 74 74 30 90 80 157 50 20 6 100 100 100 100 100 82	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.6 0.6 0.6 0.6 0.7 0.7 1.3 0.4 0.4 0.4 0.2 0.0 0.8 0.8 0.8 0.8 0.8 0.8 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	Lable 2 Ps and veget Cooking in Raw (Las) Siteamed Grilled Holled (Se Stir fried	ortion size of 3 major s ables nothed" p. key)	casonings in each coaking m  Seasonings  Sugar Airconoto Satt Sugar	Official Portion (Crispinal Provided Inc.)  Description (	neal, fish,
F042 F043 F043 F044 F045 F045 F046 F046 F046 F056 F056 F056 F056 F066 F067 F068 F068 F066 F067 F066 F067	Cassava Citrus finits Ripped papaya Ripped mango Danerra se truts Melon, Watermelon All others Nuts, Peanirts Lancelase  Cakes Discuit Daked banana Price banana Price banana Desserts (Namiwarn) her meani Jeny Packed snacks Candy Soft didniks Lea Coffee Ovatin Sugarcane juice Coconif Lice Namimonoy / namiphala Fresh finit juice Soya milk	Steamed Orlind	73 73 73 73 73 73 73 75 85 85 90 123 66 74 74 74 74 74 30 90 80 157 50 20 6 100 100 100 100 100 100 100 100 100	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.8 0.6 0.6 0.6 0.7 1.3 0.4 0.7 1.3 0.4 0.1 0.2 0.0 Not used	Lable 2 Pound of Steamed  Steamed  Holled (See Stirffied)	action shown in Lateration size of 3 major stables nothod*  p. koy)	casonings in each cooking m  Seasonings  Sugar Airconoto Sat  Sugar	Portion: Original** 1.0 0.5 0.5 0.5 0.0 0.6 0.7 0.0 0.6 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7	neal, fish,
F042 F043 F043 F044 F045 F046 F046 F046 F048 F048 F048 F049 F050 F051 F052 F054 F055 F058 F058 F058 F058 F058 F068 F066 F067 F068 F068 F068 F068 F068 F068 F068 F068	Cassava Citrus finits Ripped papaya Ripped papaya Ripped mango Danerra se truts Moion, Watermoton All others Nuts, Poannts Las redeac  Cakes Discuit Daked banana Hode banana Hode banana Dossorts (Nam warn) hode man Jeny Soft didniks Loa Coffee Ovalin Sugarcane juice Coconut Linc Nam monoy / nam phalo Emsy mith Milk (trosh)	Steamed Orlind	73 73 73 73 73 73 74 85 85 90 123 66 22 74 74 74 30 90 80 157 50 20 6 100 100 100 100 100 82	9.6 9.6 4.2 22.7 22.7 27.9 42.9 22.7 3.0 0.6 0.6 0.6 0.6 0.7 0.7 1.3 0.4 0.4 0.4 0.2 0.0 0.8 0.8 0.8 0.8 0.8 0.8 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	Lable 2 Pound of Steamed  Steamed  Holled (See Stirffied)	action shown in Lateration size of 3 major stables nothod*  p. koy)	casonings in each coaking m  Seasonings  Sugar Airconoto Satt Sugar	Portion: Original** 1.0 0.5 0.5 0.5 0.0 0.6 0.7 0.0 0.6 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7	neal, fish,
F042 F043 F043 F044 F045 F045 F046 F046 F048 F048 F046 F050 F050 F050 F050 F050 F060 F060 F06	Cassava Citrus finits Ripped papaya Ripped mango Danerra se truts Molon, Watermolon All others Nuts, Poannts Lancelase  Cakes Discuit Daked banana Price banana Price banana Desserts (Nam warn) her mean Jeny Packed snacks Candy Soft didniks Loa Coffee Ovatin Sugarcane juice Coconit Lice Nam monoy / nam phala Fresh finit juice Soya milk	Steamed Orlind	73 73 73 73 73 73 73 74 65 65 90 123 66 74 74 74 30 90 80 167 50 50 100 100 100 100 100 100 100 100 1	9.6 9.6 4.2 22.7 27.9 42.9 42.9 72.7 3.0 0.8 0.6 0.6 0.3 0.7 0.7 1.3 0.4 0.4 0.4 0.4 0.2 0.0 Not used	Lable 2 Ps and veget Cooldings Raw (Last Steamed Boiled (Se Stiritied	action shown in Lateration size of 3 major stables nothod*  p. koy)	casonings in each cooking m  Seasonings  Sugar Airconoto Sat  Sugar	Portion: Original** 1.0 0.5 0.5 0.5 0.0 0.6 0.7 0.0 0.6 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7	neal, fish,

Table 3 M ean food group intakes: results of 3-day sem i-weighed dietary record (DR) and food frequency questionnaire before DR in summer, 2005

		M ean daily	intake		
	_	D R	FFQ	DR/FFQ*	FFQ/DR
Cereals	g/day	429.3	470.4	0.913	1.1
Nuts and seeds	g/day	0.4	3.2	0.138	7.3
Potatoes	g/day	1.3	10.0	0.132	7.6
Sugars	g/day	2.0	5.6	0.352	2.8
Confectioneries	g/day	1.0	113.2	0.009	116.7
Fats and oil	g/day	2.5	2.0	1.214	8.0
Pulses	g/day	0.0	8.0	0.047	21.4
F ru its	g/day	17.1	49.0	0.349	2.9
Vegetables	g/day	145.0	203.2	0.714	1.4
Seasonings	g/day	20.5	3.7	5.470	0.2
Fish	g/day	41.7	48.1	0.866	1.2
M eats	g/day	39.5	45.4	0.870	1.1
Eggs	g/day	4.3	9.7	0.440	2.3
M iks	g/day	0.4	2.7	0.154	6.5

<sup>\*</sup>The values were used as a correction facor (see text for more in detail).

Table 4 Mean energy and selected nutrient intakes by village: results of 3-day seminweighed dietary record (DR) and food frequency questionnaire before DR in summer, 2005

D ietary assessm	entm ethod		- :	3-day semi	iw e ighed d	lietary red	ord				Food free	uency que	stionna ir	е
V illage	_	V 1	V 2	V 3	V 4	V 5	ANOVA	Tota⊁	V 1	V 2	V 3	V 4	V 5	ANOVA
n		40	35	12	12	12		111	40	35	12	12	12	
Age	years	24.2	27.9	25.5	24.8	25.5		25.7	24.2	27.9	25.5	24.8	25.5	
Crude intake														
Energy	kca l∕day	1559	1793	1711	1675	2177	<0.001	1728.7 ±436.7	1352	1617	1416	2208	1431	<0.05
Prote in	g/day	52.2	54.8	51.4	54.7	60.3	ns	54.1 ±16.4	46.5	55.6	44.3	61.4	45.7	ns
Fat	g/day	13.4	13.0	16.2	11.8	14.5	ns	13.5±7.3	15.2	16.4	14.6	16.2	10.8	ns
Carbohydrate	g/day	302.7	359.6	333.8	335.5	448.0	< 0.0001	$343.3 \pm 91.5$	256.6	311.2	276.2	453.7	287.5	< 0.01
Cabium	m g∕day	349.9	387.0	503.5	408.2	600.9	<0.0001	411.6±178.1	284.6	387.6	243.7	374.6	334.3	ns
Phosphorus	m g∕day	485.1	555.4	595.7	540.6	747.9	<0.0001	$553.7 \pm 65.5$	499.5	630.1	482.5	722.5	562.3	ns
Iron	m g∕day	11.4	12.7	13.1	12.0	17.6	<0.001	12.7 <del>±4</del> .1	10.7	13.2	10.7	15.3	11.5	ns
Retinol	<sub>μ</sub> g ∕day	307.3	270.7	361.6	331.5	500.0	ns	325.1 ±288.1	142.3	174.5	112.2	110.1	114.3	ns
Vitam in B <sub>1</sub>	mg/day	0.7	8.0	0.7	0.7	1.0	<0.001	$0.8 \pm 0.2$	0.6	0.7	0.7	1.0	0.7	<0.01
Vitam in B <sub>2</sub>	mg/day	0.4	0.4	0.4	0.4	0.7	ns	$0.4 \pm 0.4$	0.5	0.7	0.6	0.8	0.8	ns
Niacin	mg/day	8.4	9.5	8.9	9.5	13.5	< 0.0001	$9.5 \pm 3.3$	8.3	10.3	8.4	12.5	10.5	< 0.01
V itam in C	mg/day	40.0	42.8	54.2	51.3	74.5	< 0.01	$47.4 \pm 35.5$	28.9	31.3	25.5	25.2	24.4	ns
Dietary fiber	g/day	4.5	5.0	6.1	6.4	7.3	< 0.0001	5.4 ±2.3	5.2	6.8	4.9	6.5	5.5	ns
Energy density v	/a lue													
Prote in	% ofenergy	13.2	12.3	12.1	13.1	11.1	<0.05	$12.5 \pm 2.2$	13.9	13.9	12.9	11.1	13.2	<0.05
Fat	% ofenergy	7.6	6.4	8.9	6.3	6.2	ns	$7.1 \pm 3.2$	10.4	9.2	9.3	6.6	7.0	< 0.0001
Carbohydrate	% ofenergy	78.0	80.3	77.6	80.1	82.2	<0.05	$79.3 \pm 4.6$	75.5	76.8	77.7	82.2	79.7	< 0.001
Cabium	m g/1000kcal	223.5	213.4	300.0	239.8	271.6	<0.05	$235.6 \pm 7.6$	218.8	251.9	184.7	169.2	256.6	ns
Phosphate	mg/1000kcal	310.8	309.7	351.1	324.2	343.2	<0.01	$319.8 \pm 46.4$	375.7	395.9	352.5	327.5	409.5	ns
Iron	m g/1000kca1	7.2	7.1	7.7	7.2	7.9	ns	$7.3 \pm 1.2$	8.0	8.2	7.8	6.9	8.3	ns
Retinol	<sub>μ</sub> g/1000kca l	198.0	149.6	217.1	185.4	209.7	ns	$184.7 \pm 144.3$	112.0	107.1	85.7	50.6	86.0	<0.05
Vitam in B <sub>1</sub>	m g/1000kcal	0.4	0.4	0.4	0.4	0.5	ns	$0.4 \pm 0.1$	0.5	0.5	0.5	0.4	0.5	ns
Vitam in B <sub>2</sub>	m g/1000kca1	0.3	0.2	0.2	0.2	0.3	ns	0.3±0.2	0.4	0.5	0.5	0.3	0.6	ns
Niacin	m g/1000kcal	5.4	5.2	5.1	5.7	6.1	<0.05	5.4±1.0	6.2	6.4	6.0	5.7	7.6	ns
V itam in C	m g/1000kcal	26.0	23.9	30.9	28.3	32.4	ns	$26.8 \pm 17.6$	23.1	20.6	19.8	11.4	17.9	<0.05
Dietary fiber	g/1000kca l	3.0	2.9	3.5	3.9	3.3	<0.05	3.1 ±1.2	4.0	4.3	3.7	2.9	4.0	ns

<sup>\*</sup>M ean ± SD

were relatively higher and carbohydrate intake was lower in the subjects of Kockphork. Some micronutrient intakes such as iron, vitamin B1, vitamin B2, niacin, and vitamin C were also relatively higher in the subjects of Kockphork. This tendency was seen in FFQ for some nutrients such as iron, vitamin B2, and niacin, but not for others.

Table 5 shows the Spearman correlation coefficients between energy and nutrient intake levels estimated from the first FFQ and those assessed with DR at an individual level. Weakly positive correlation was seen for most nutrients with significant correlations for some nutrients such as carbohydrate, vitamin B1, and vitamin B2 [0.19] and niacin [0.21].

Table 6 shows the Spearman correlation coefficients between energy and nutrient intake levels estimated from the first and second FFQs at an individual level. Highly significant and positive correlation was observed for most nutrients (r ranged from 0.27 [vitamin B2] to 0.60 [carbohydrate], p<0.001) except for retinol.

Village: V1 = Lahanam thong, V2 = Lahanam tha, V3 = Thakham liane, V4 = Dongbang, V5 = Kockphork.

Table 5 Correlations between energy and selected nutrient intakes assessed with 3-day sem i-weighed dietary record (DR) and food frequency questionnaire before DR (n=111)

	C rude	e value	Energy dens	ity value
	Unit	r#	Unit	r#
Energy	kca l∕day	0.17		
Protein	g/day	0.05	% ofenergy	-0.09
Fat	g/day	-0.07	% ofenergy	-0.14
Carbohydrate	g/day	0.21 *	% ofenergy	0.12
Cabium	mg/day	0.02	m g/1000kcal	0.03
Phosphorus	mg/day	0.08	m g/1000kcal	0.01
lron	mg/day	0.08	m g/1000kcal	0.01
Retinol	μg ∕day	0.02	<sub>μ</sub> g ∕1000kca l	80.0
Vitam in B <sub>1</sub>	mg⁄day	0.19 *	mg/1000kcal	0.16
$V$ itam in $B_2$	mg/day	0.19 *	m g/1000kcal	0.19 *
Niacin	mg/day	0.21 *	m g/1000kcal	0.19 *
Vitam in C	mg/day	0.16	m g/1000kcal	0.18
Dietary fiber	g/day	0.07	g/1 000kca l	0.09

<sup>#</sup> Speam an correlation coefficient

Table 6 Correlations between energy and selected nutrient intakes assessed with 2 food frequency questionnaires one month apart (n=111)

	C rude	va lue		Energy densi	ty value
	Unit	r#		Unit	r#
Energy	kca l∕day	0.58	***	_	_
Prote in	g/day	0.38	***	% ofenergy	0.35 ₩₩
Fat	g/day	0.36	***	% ofenergy	0.39 ***
Carbohydrate	g/day	0.60	***	% ofenergy	0.41 ***
Cabium	mg∕day	0.40	***	m g/1000kcal	0.41 ***
Phosphorus	m g∕day	0.44	**	m g/1000kcal	0.44 ***
lron	mg∕day	0.43	**	m g/1000kcal	0.37 ***
Retinol	<sub>u</sub> g ⁄day	0.07		ug/1000kca l	0.09
Vitam in B <sub>1</sub>	mg/day	0.55	***	mg/1000kcal	0.33 ***
Vitam in B <sub>2</sub>	mg∕day	0.27	**	m g/1000kcal	0.36 ***
Niacin	mg/day	0.44	***	m g/1000kcal	0.41 ***
Vitam in C	mg/day	0.48	**	m g/1000kcal	0.46 ***
D ietary fiber	g/day	0.56	**	g/1000kca l	0.48 ***

<sup>#</sup> Speam an correlation coefficient

# Discussion

As adults living in Lahanam as a target population, we have developed FFQ and the calculation algorism of food and nutrient intakes using the data of DR collected from the target population. This type of the development, i.e., data-based approach, is recommended to develop FFQ when the target population is decided before the development and the reliable basic data are exist (8). But this type of development has rarely been used in developing societies mainly because a lack of the reliable basic data. We have fortunately collected DR data in 2004, and they were used for the development.

In many cases, severe over- and underreporting is observed for some food groups (9). This was also the case in the present study. Some food groups with very low intakes in DR such as nuts and seeds, potatoes, confectioneries, pulses, and milks were severely overreported, more than five times. The reason of this overreporting is unclear. The more analysis is needed to know the reason and to develop the correction

<sup>\*</sup>p<0.05.

<sup>\*\*\*</sup> p<0.001, \*\* p<0.01.

#### methods.

The mean intakes of nutrients were not so different when overall mean values were compared between FFQ and DR. However, in the village-level analysis, the results were different. Moreover, the correlations between FFQ and DR were null or low. This means low validity of FFQ. On the other hand, high reproducibility was observed in most nutrients.

Moreover, the data of DR collected in autumn were used for the development of FFQ, and the validation study was done in summer. Seasonal variation of food availability may be one of the most important problems to consider when habitual, i.e., "year-round", intake is interesting. DR data in winter (dry season) and spring (hot season) besides in summer and autumn are necessary in order to consider differences of food availability between seasons.

In conclusion, we developed FFQ for people in rural Laos using databased approach of questionnaire development. Although the reproducibility was relatively satisfactory, the validity was not enough for the use in future researches. More detailed analysis is needed to develop more reliable calculation algorism of food and nutrient intakes for this FFQ. The more data collection may also be required for developing FFQ with higher validity.

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